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OCCASIONAL PAPERS.

THE ACTION OF CAVALRY AND HORSE ARTILLERY ILLUSTRATED BY MODERN BATTLES.[1]

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I CANNOT help feeling that in giving a lecture on the subject of Cavalry and Horse Artillery I have placed myself at a slight disadvantage in limiting myself, as, according to the programme, I have done, to modern battles for my illustrations. To find the best instances of cavalry and horse artillery acting in co-operation, we must go back to the wars at the commencement of the century, and we might also find in our Indian campaigns, which can hardly be termed modern warfare, several brilliant examples of these two arms mutually supporting one another. The short time at our disposal will not, however, allow us to examine records so far from our own day, when the conditions of the situation as regards armament were so widely different from what they are now, and where we cannot take a comprehensive view it will be better only to regard what is most likely to be of immediate benefit in these latter days. We shall, therefore, confine ourselves almost entirely to the war of 1870, the first occasion since the introduction of breechloaders on which two great opponents faced one another similarly equipped. You may, however, fairly ask me why, if horse artillery is in modern times still a necessity to cavalry, as I believe it to be, and if, as I also believe, there is still a great future before horsemen, still verge and scope for the action of squadrons even on the battlefield itself, you may ask me, I say, why modern warfare does not present us with such salient examples for our purpose this evening as do the great struggles of past years. It is a fair question, but, I think, I can give

[1] This essay is the substance of a lecture given in the hall of the Middle Temple, on February 20, 1893, at the request of Colonel Cecil Russell, commanding the Inns of Court Rifle Volunteers.

you a complete reply to it. But before I do so I will ask you to bear with me a moment while I explain to you how it was that horse artillery was called into existence at all. When you understand its *raison d'être*, you will better appreciate the argument I shall bring forward.

Now the origin of horse artillery was briefly this:—

When Frederick the Great set himself to perfect his army, and turn it into the magnificent fighting machine it ultimately became, one of the first reforms he had to introduce was with reference to the employment of his cavalry. The world was just then, as it is now, hugely impressed with the value which new improvements had given to musketry, and there was a tendency even with cavalry to rely on lead rather than on steel. Frederick found his squadrons waiting to receive an attack in position, and then, having poured in a volley, charging to take advantage of its effect. All the dash and enterprise which should distinguish the most mobile arm were therefore gone, and the dragoon had become a bad trooper and a worse musqueteer. The genius of the King saw that such tactics took away all the characteristics that made cavalry valuable, and he set himself to stamp out the heresy energetically. I may here remind you that we see an example in our own times of history repeating itself, in the manner in which the fire action of cavalry has been accentuated, especially in the Russian army, where they have armed the dragoons once more with rifle and bayonet, and this new departure is regarded by many with the same dislike as it was by Frederick. His measures to improve matters were somewhat more decisive than we are used to now-a-days. He issued an order to his squadrons, "Nimmer zu halten, nimmer zu stocken, aber immer stets zu attackiren," that is to say, they were *always* to attack, and, further, he declared that any officer who waited in the old way to receive the enemy should be tried by Court-martial.

His cavalry, trained and splendidly led by two of the most capable cavalry leaders that ever lived, Seydlitz and Ziethen, were soon renowned for the precision and rapidity of their swoop, and have probably never been surpassed.

But having developed its "shock" powers at the expense of its fire effect, he had to make the latter good in some other way.

Cavalry is essentially an offensive arm, it cannot defend itself except by counter-attack, and in certain situations it is at the mercy of a few well-placed marksmen. "Cavalry," Napoleon tells us, "cannot reply to fire, and can only fight with the steel." Batteries of artillery lightly equipped, and with their detachments mounted like troopers, were therefore organized by Frederick to move and act with cavalry, and supply them with the powers he had shorn them of. And the co-operation of the two arms was, and has since been, found to work out in another way, to the benefit of both, because, while guns loosened compact formations for the horsemen, the cavalry forced the scattered troopers to draw together, and thus present an easier target to the guns.

Napoleon, who appreciated the value of fire more than any man of

his time, and also reaped immense results from a skilful use of cavalry, recognised the value of a mobile artillery too, and under this great example its use became general. Napoleon, too, more than any other general before or since, taught his cavalry to act with boldness in reconnaissance work ahead of his armies, and it was by means of the information as to his enemy's plans and position which an abundant and energetic cavalry placed at his disposal that many of his most celebrated strokes were rendered possible. Thus, during his advance to Russia in 1812, Murat, with the advanced cavalry, was often 50 miles ahead of his army. So it was that not only did cavalry in his day come into collision with the enemy on the field of battle to an extent such as we shall never see again, but cavalry raids and combats took place ere the main forces came in contact at all. A powerful cavalry meant a vigorous pursuit. Other nations, to meet his horsemen, had to adopt similar tactics, and thus great opportunities for the action of cavalry and its complement horse artillery were given in the long wars that marked the end of the last and the commencement of the present century. And by no batteries were opportunities more worthily turned to account, let me add, than by our own brilliant troops in the Peninsula, and in Belgium a few years later.

During the long period of peace, however, that succeeded Waterloo, which represented the lull after the storm, many of the lessons of the great battlefields were forgotten, and when in 1870 the Prussians sent the ubiquitous Uhlans roaming through France, men stared in amazement as though a new epoch in the art of war had opened. Yet they were doing but that which Napoleon had shown to be essential to the safety of an army 70 years before, and did not do it either nearly so well as he had done.

But the French had not profited by the study of military history as their opponents had, and their squadrons, brave and eager as they proved themselves more than once in the actual fight, were held aimlessly in hand, tied to the same road on which moved the other troops. No cavalry was sent scouting far away in front or on the flanks, and even in retreat they rarely or never attempted to prevent the inquisitive inroads of the pursuers. It takes two, we all know, to make a quarrel, and a cavalry combat is no exception to the general rule. There were few in 1870 because the German troopers had it, to use a familiar expression, "all their own way." Consequently, the horse artillery and cavalry had no need to support one another, and there were in 1870 only a few examples of their co-operation in the most important *rôle* they can be called upon to adopt.

Such, briefly, is the explanation, and it applies also largely to 1866, of the fact that we find richer ground for research if we retrace our steps to the earlier periods. And it is very necessary that you should understand this, because it is as certain as anything in this world can be that, if we have another great war on the Continent in the near future, we shall again see the two arms we are dealing with working together, to an extent and upon a scale which even Napoleon never dreamt of. All nations have studied and profited by the lessons

of 1870, and on all sides we see signs that tell us that vast swarms of cavalry will shroud and protect the advance of modern armies. When both sides adopt these same tactics, their cavalry will surely come into collision, and we shall see squadrons supported by horse artillery taking part in contests which will materially affect the progress of subsequent events.

In 1870, when the cavalry divisions of the Germans were thrust forward alone, horse artillery always accompanied them, although when the battle took place we find them employed apart from the horsemen in the general line of battle; for guns, be they horse or field, must never be allowed to stand by idle when their fire may be utilized.

But, besides being essential to one another in this most important *rôle*, cavalry and horse artillery will find opportunity and need to work harmoniously together in other emergencies.

Horse artillery and cavalry will form part of the immediate advanced guard of every considerable force, will have to reconnoitre the enemy's strength and position, delay his onset, or check his retreat, until the main body arrives.

They will also, perhaps, find their most useful and most honourable *rôle* in covering a retreat of their own side, and it is to their skill, readiness, and, if need be, self-sacrifice, that their comrades look for salvation in the most trying circumstances in which soldiers can be placed.

Horse artillery and cavalry may also be employed on the field of battle itself to make a flanking movement, or, by their mobility, forestall the enemy at some important point.

And finally, they may act together with advantage in the pursuit of a beaten foe.

But since the action of horse artillery and cavalry acting together by themselves affords to the brilliant leader the best chance of distinguishing himself, and is the most characteristic, the most effective, and, alas! the most difficult *rôle* in which the combined efforts of the two arms can be utilized, I will first speak of it, adding to the ideal and theoretical description a few instances from recent warfare, by way of illustration. And I may preface my brief remarks on this point by explaining that, according to the latest regulations, a cavalry division would, in our Service, usually be composed of 2 brigades, or 6 regiments of cavalry, with 4 machine-guns, 2 batteries of horse artillery, and a battalion of mounted infantry, to which likewise 2 machine-guns would be attached. We shall be hardly within the limits of our discussion this evening if we enter into the question of how these latter-day adjuncts to the cavalry division are to be employed. The Germans carried infantry in carts on more than one occasion during the war of 1870, and our mounted infantry may show themselves useful in advance of the main body under certain circumstances again; the question, until we have some experiences of recent war to go upon, must, however, be a theoretical, perhaps a controversial, one, but, since the question of an escort to guns has ever been a difficult one, the new additions will, in this respect, probably prove a welcome assistance and support.

For, in the event of a collision between bodies of cavalry being imminent, the guns will be called upon to move rapidly and boldly forward straight to their front, considerably ahead of the horsemen. And this for two reasons: to get into action, if they can, before the hostile artillery, and to gain as much time as possible in which to produce their effect. The exact distance they should go forward must be left largely to circumstances, but Von Schell, a high authority, says they should advance one-third the distance which separates the opposing forces. Another distinguished officer has recommended the artillery commander to watch carefully the opposing lines, estimate as far as possible the spot on which the two front lines of squadrons will come in contact, and strive to get into position 300 yards short of, and the same distance on the flank of, the point of first conflict. We may note how much judgment, how much boldness, how much decision is therefore required on the part of him who leads the guns, and how immediately associated their action, to be effective, must be with that of the other arm. Some one will, perhaps, object that it is dangerous to send guns thus boldly forward. Why? If the hostile squadrons fall upon them they will do the very thing they should not. For if the cavalry and guns are really working together, when the enemy turns on a battery they will expose their own flank to assault, and, in any case, they can, after all, injure the artillery but to a very small extent. What may appear temerity is, therefore, the surest bid for success.

The guns will usually be on the flank, and their outer flank will need protection. A squadron would usually be detailed for that duty, and might have to dismount some of its files in certain cases to call in the aid of fire.

It is obviously a mistake, however, thus to weaken the cavalry, for they will need every sabre in the coming *mêlée*, and therefore it is not unlikely that a sphere of usefulness will be opened up here for the mounted infantry and machine-guns, in which they may on occasions display their special characteristics with success. The point to be specially noted is the very short time there will be for the guns to produce an effect, and that against a varying target also. For the artillery officer will have to exercise quick decision as regards the choice of his objective. Is he to fire at the enemy's guns, or at their squadrons? The answer is that the arm at the moment the most dangerous must be attacked, and circumstances must influence him here.

It is for these reasons that extreme quickness, or what we call smartness, has been looked for, both from officers and men who wear the jacket. It was not through mere bravado, or to please the gallery, therefore, that the old troops took pride in getting off a round quickly, but because, since it was necessary to get to a short range in order to have a chance against their rapidly-moving target, none of the fleeting moments might be wasted. Even in these days of long ranges in combats between cavalry such as we are describing, which will herald the approach of struggles on a larger scale, distances and opportunities will still be short as ever, and the same qualities, both physical and

mental, will be needed in the horse gunner, if he is to do his duty properly. The gunners, too, were, and are, men selected for their physique, because in order to leap on a limber or mount a horse with facility something more than the average stature of the soldier is required. No more pitiable object is to be seen than a little man trying to get on the back of an impatient charger, with one foot in the stirrup and one on the ground, especially if a Ghazi with a long knife is coming after him! The labour of running guns up after their recoil during rapid firing is also immense, and requires strength on the part of the detachment.

We may find an illustration of the severe labour that is sometimes thrown on gunners in this respect from the records of the Egyptian campaign of 1882.

In the very first action of the war two guns were sent forward from Ismailia to gain possession of a dam across the Sweet Water Canal at Magfar. These guns were in action for several hours in heavy sand, and the detachments became so exhausted by the labour involved in working the guns that they became completely unable, in several cases, to carry out their duties. The drivers had to be called upon to take their turn at the wheels, and subsequently the aid of the marine artillerymen, who were in action close to, had to be invoked.

As to the question of what projectile the guns are to use, as a general rule, it may be assumed that shrapnel will probably be fired at the personnel of the enemy's guns in the earlier stages of the action, but, as soon as the first line of his squadrons comes within effective range, it would seem desirable that the greater part, at any rate, of the guns should open on them with shrapnel shell and percussion fuzes, or even with common shell. It will be impossible, in the short time at disposal, to bore time fuzes, and the effects of common shell, both moral and material, should be great amongst horses. If the hostile guns are not harassed by a lively fire, they will have free scope to play upon and demoralize our own horsemen.

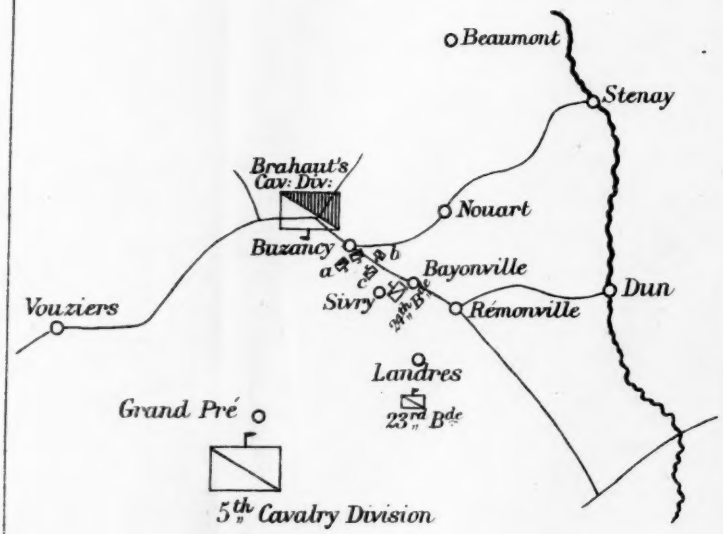
As soon as the two front lines of horsemen have met in conflict, the guns may turn their attention to the second line and reserves, and ward off any flank attack.

In the event of success or failure being distinctly pronounced, the *rôle* of the guns would be obvious and need not be dwelt on, but occasionally it may be a knotty point for the leader of the batteries to decide whether he should remain in action or whether he should retire to some position in rear. He must leave selfish considerations out of sight. But which will be best for his friends? Probably to stay unlimbered, for it is during a repulse that guns may be of most assistance, and it is often the last round that tells. Yet to stay behind too long may cause the cavalry losses in a desperate attempt to extricate them. The artillery leader in this position has need both of pluck and judgment, and his state may be likened to that of a man watching his friend battling with a wild torrent, and uncertain whether to leap in at once and make a hopeless effort to save him, or stay for a moment to launch a boat.

The most difficult position of all, however, would occur when a

ACTION AT BUZANCY

27TH AUGUST 1870.



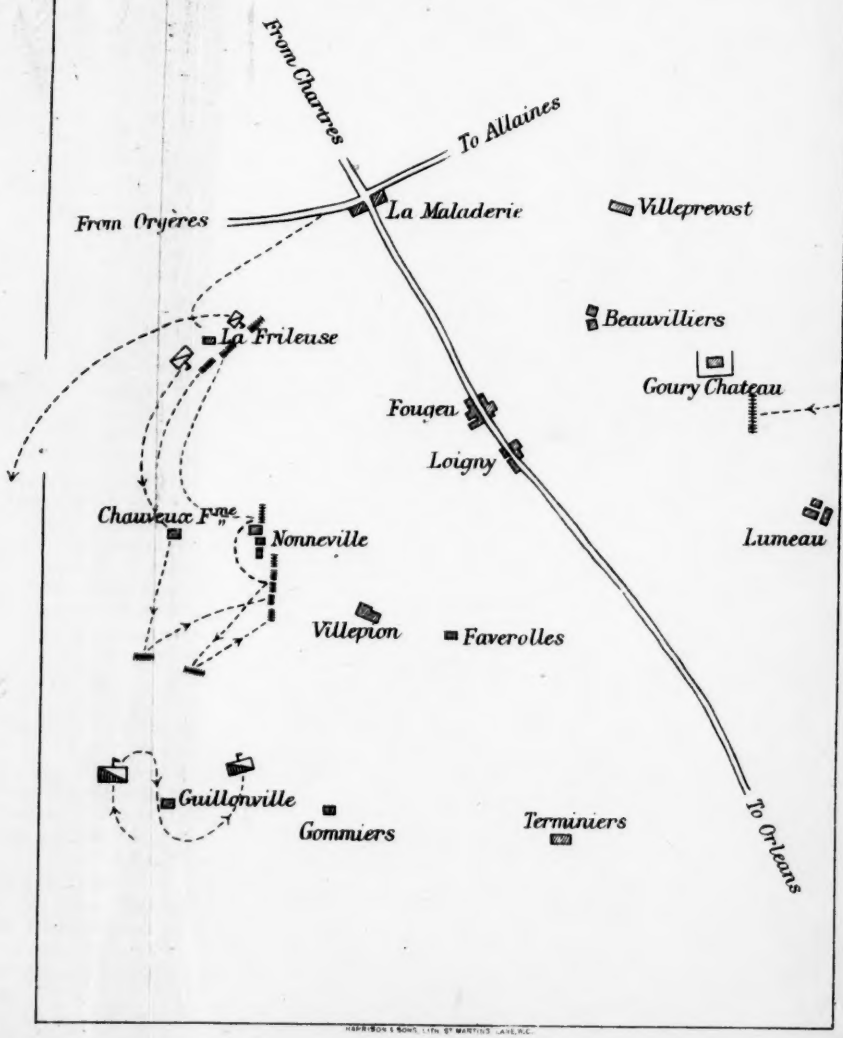
a. 2 Squadrons Chasseurs.
b. Capt. v. Wolderdorf's Squadron.
c. Advanced guard of 24th " Bde

German cavalry shown thus .....
French ..... " ..... " ..... "

HARRISON & SONS, LITH. ST MARTINS LANE, W.C.

BATTLE OF LOIGNY-POUPRY

2ND DECEMBER 1870.



HARRISON & SONS, 59TH ST MARTIN'S LANE, W.C.

mingled mass of friends and foes comes surging back upon the guns. It would be a very knotty point to decide whether the guns should, under such circumstances, remain in action or limber up in the hope of getting a clear front of fire further to the rear, and the exigencies of the moment must be allowed to settle the problem. As a general rule, however, it will be the best to remain in position. It is in crises such as these that the support of guns may be sufficient to turn the scale, and to withdraw would, in the majority of cases, be a risky proceeding. Von Schell suggests the heroic remedy of firing indiscriminately into the confused mass, thus disentangling it, and forcing the enemy to loosen his grip. There are no instances, as far as I am aware, of such drastic methods having been deliberately adopted, but it is scarcely likely that, even had they been, a record would be preserved in the Official Account.

There was an occasion during the Crimean war, however, when something of this kind did occur. Dr. W. H. Russell, then correspondent to the "Times," wrote as follows concerning the action of the Russian artillery after our Light Brigade had made their celebrated charge at Balaclava: "At the very moment when they were about to retreat, an enormous mass of lancers was hurled on their flank. Colonel Shewell, of the 8th Hussars, saw the danger and rode his few men straight at them, cutting his way through with fearful loss. The other regiments turned and engaged in a desperate encounter. With courage too great almost for credence they were breaking their way through the columns which enveloped them, when there took place an act of atrocity without parallel in the modern warfare of civilized nations. The Russian gunners, when the storm of cavalry passed, returned to their guns. They saw their own cavalry mingled with the troopers who had just ridden over them, and, to the eternal disgrace of the Russian name, the miscreants poured a murderous volley of grape and canister on the mass of struggling men and horses, mingling friend and foe in one common ruin." It is to be noted, however, that the action of the Russian artillery was unjustifiable in this case, because our cavalry were not bearing down victoriously on their enemy's position at the moment, but were leaving it. The statements of eye-witnesses, whom I have consulted, likewise throw considerable doubt on the account as given by Dr. Russell, and it is very probable that the Russian gunners acted less deliberately, and that their friends suffered less at their hands than we are led to believe by it. Should an artillery officer, however, ever be placed in so trying and painful a situation that, in order to save the bulk of the force he was acting with from destruction, he felt bound to run the risk of sacrificing the lives of some of his friends, his motive would be a commendable one, and should not expose him to censure, far less to execration.

With reference to the value of the assistance some riflemen may be to horse artillery in certain situations, and the allusion which has been made to the employment of mounted infantry in this manner, we have, as far as I am aware, no experience in war subsequent to the Crimean era. During the affair of the Bulganak, however, the

day before the battle of the Alma was fought, the need for an escort of infantry was felt by our horse artillery, and the want was made good in an impromptu manner, which appears to foreshadow what may be done in the future more easily and effectively through our modern organization.

The Russian cavalry and horse artillery were supported by three or four battalions of infantry, and, as these advanced, our two troops of horse artillery (I and C), under Brigadier-General Fox Strangways, galloped forward from where they already were in action against the Russian cavalry and Cossacks, their fire from their new position being effective. The Black battery of the Light Division was also soon in action. The Russian cavalry, feeling the effect of the artillery fire, quickly retired out of range, and C troop, as Lord Raglan did not wish a general engagement brought on, moved back to the ground about 300 yards in advance of where they had at first come into action, and fronted the Russian infantry and guns, both of which had now been reinforced. Sir George Brown had by this time got the Light Division up, and extended in line, but just out of sight behind the ridge, and he, or Lord Raglan, desired that some men of the 2nd battalion Rifle Brigade might be taken on the guns of C troop to act as sharpshooters, in the event of another advance into action. "This battalion had practised with the Minié rifle at Canterbury in 1853. The Light Division regiments had all, or nearly all, been at Chobham Camp in 1853.

"The riflemen were accordingly placed on each axletree box, one on each trail, and three on the limber boxes; the limber gunners themselves stood on the trail handles, and held on by the limber boxes. This was done with the concurrence of General Strangways, and Sir George Brown was afterwards pleased to call the troop his 'Rifle troop'; however, there was no further attempt on the part of the Russians to renew the fighting, and this ended the 'affair of the Bulganak.'"[1]

It does not seem unreasonable to assume that, had Lord Raglan had at his disposal the resources one of our leaders of to-day will possess, he would gladly have utilized their services on this occasion; and the incident is interesting as an example of the unforeseen demands which the exigencies of the battlefield occasionally impose upon us.

Such are some of the more salient features of the action of horse artillery and cavalry acting independently of the other arms. As we have already noticed, there are but few examples of such action to be gathered from the war of 1870, perhaps the only genuine one having taken place during the small affair at Buzancy, on the 27th August, during MacMahon's celebrated flank march to Sedan. (Plate 1.)

The Saxon Cavalry Division, covering the front of the XIIth Corps, which was to cross the Meuse at Dun, had assembled its 23rd Brigade at Landres during the forenoon. The 24th Brigade was sent forward

[1] See the "History of C Battery, A Brigade," by Colonel F. A. Whinyates, p. 91.

to the north to reconnoitre, the 18th Lancers working towards the Buzancy-Stenay road, while the 3rd Cavalry with a battery of horse artillery had reached Rémonville, and pushed forward an advanced guard, consisting of one troop of the 1st and two troops of the 5th squadron, towards Buzancy. At about 11 o'clock this advanced guard reported that there was a regiment of French cavalry in front of it, and that the town was occupied by the enemy.

Now, the troops observed were the cavalry of the 5th Corps of the French, which was so disastrously defeated at Beaumont three days later, and which was now formed up at Bar, Brahaut's cavalry division being pushed ahead of it as far as Buzancy. Two squadrons of the 12th Chasseurs were on the south of that town, the issues of which were held by dismounted troopers, but the bulk of the cavalry were still on the north of it. Meanwhile, on the German side, the 18th Lancers had concluded their reconnaissance, and had moved to Rémonville. The leader of the 24th Brigade (General Senfft von Pilsach), having now united his brigade again, ordered it to move forward through Bayonville. He then rode on to the advanced guard, and, seeing the weakness of the opposition, ordered it to charge the Chasseurs. This was done, and with such good effect that the hostile squadrons were driven back to Buzancy, and, in spite of the carbine fire with which they were received, the Germans succeeded in pressing into the town after them. There a hand-to-hand *mêlée* ensued, and the French, coming on in superior numbers, gradually forced their opponents from the houses and pursued them for some distance beyond. But the captain of the 1st squadron (Von Woldersdorf) had taken up a position on the east of the Rémonville road, from which, in the event of the weak advanced guard being forced backward (which was what actually occurred), he might fall on the flank of the pursuing French and take them in a most vital point in the midst of their career of triumph.

It seems to me that this same Von Woldersdorf (I do not know if he afterwards rose to distinction or not) was a man imbued by Nature with a genius for war. Many of us can be wise after the event, can show how Napoleon ought to have won Waterloo, or Moltke have lost Gravelotte. But this man was wise before the event, and displayed judgment and decision at a critical juncture during the fleeting moments of a cavalry combat. Ninety-nine officers in a hundred moving in support of that advanced guard would have manœuvred somewhere in rear of it, but he, with an instinct which did not lead him astray, carried his command boldly to a position from which the greatest results were bound to follow on its swoop. He appreciated the situation, and recognised the decisive point. In one word, he acted like a born soldier.

The event proved the correctness of his judgment; his attack on the left flank of the Chasseurs enabled the flying Germans to rally and face their foes, and the Chasseurs, assailed both in front and flank, were driven back once more within the shelter of the houses.

But now the weakness of cavalry is exemplified. The carbine fire from the village denied further progress to the Saxons, who fell back

to a distance of some hundreds of yards from it, while the remainder of the brigade moved up to Sivry.

And now the guns supplemented the efforts of the horsemen. The battery of horse artillery was brought into action on some heights close to, and directed a well-aimed fire on the Chasseurs, who, supported by the musketry fire, were again advancing. The fire of these guns was so effective that, as the Official Account tells us, the French "withdrew in such haste that a squadron of the lancers (it had not yet been engaged), which was now likewise advancing, was unable to reach them." At 1 o'clock the skirmish had come to an end. The two German squadrons who were engaged had lost 32 men and 27 horses; both the captains were wounded. Twelve French Chasseurs and Lieutenant-Colonel de la Porte, who was wounded in several places, were made prisoners. Subsequently the French fell back from Buzancy, and the Saxon Cavalry Division was sent to reconnoitre towards Nouart late in the afternoon, the cavalry working towards Nouart, Barricourt, and Villiers-devant-Dieu.

The affair is only regarded as a little skirmish in the German Official Account, but is, nevertheless, interesting and remarkable as being, perhaps, the most characteristic horse artillery and cavalry action in the whole war. It brings out also the value of artillery well, as the French, although in superior strength in, and on the other side of, Buzancy, are stated to have declined the combat owing to their having no artillery to support them.

And what was the result of the want of enterprise on the part of the French cavalry? Briefly this. Three days later, the men of the 5th Corps were round their cooking pots at Beaumont getting their dinners ready, when German shells came tumbling into their camp. Their cavalry had not secured their safety, you see; they did not know of the foes that were closing in upon them, and the surprise of Beaumont foreshadowed the disaster of Sedan.

I have shown you, too, the value of horse artillery to cavalry, and how the French felt the need of it here, but I don't wish anyone to imagine that I speak in any prejudiced or partisan spirit. Far from it; cavalry well led may overpower guns too. And if you care to see the other side of the medal, look at Tobitschau.

It was an action fought on the 15th of July, 1866, when the Austrians were retreating from Olmütz. On that day Bredow's cuirassier regiment (remember this Bredow, for he is a good soldier too, and you will hear of him later on), ably led so as to take advantage of the lie of the ground, got in amongst a great Austrian battery in action, and their charge was so sudden and effectual that the regiment captured 18 guns, 7 wagons, 168 horses, and 170 prisoners, with a loss of only 8 men and 12 horses. A noble prize truly for one regiment, and an excellent example of the power of cavalry in the hands of an adroit commander.

As an instance of the employment of horse artillery in an advanced guard action partaking of the nature of a reconnaissance in force, the most brilliant example in recent times that we can mention is the battle of Vionville, because the consequences of the bold inter-

vention of these two arms on that occasion were immense and far-reaching, and because the audacity with which they fastened on the immensely superior French forces is unrivalled in the annals of war.

Bazaine was endeavouring to make good his retreat westwards from Metz, while the Germans were sweeping round his flank in order to throw him back on that fortress. To hold the enemy fast till reinforcements might have time to come up was, therefore, of vital importance.

The 5th Cavalry Division at 9 o'clock on the 16th of August surprised the bivouacs of Forton's cavalry at Vionville, and at once the four horse artillery batteries that were with it began shelling the French camp from the Tronville heights.

A German officer, General Eltorff, has just published a pamphlet, as a supplement to the well-known "Militär-Wochenblatt," dealing with the performances of this 5th Cavalry Division at the battle we are considering. This is how he describes the wonderful scene that the Germans saw when they first mounted the heights east of Tronville :—

"Just as our advanced patrols had informed us, a large French cavalry bivouac is found on the west of Vionville. Some squadrons are busy watering their horses, some are cooking, not a charger is saddled! Truly a picture of the most peaceful, easy-going existence found haply amid the turmoil of war, and this, too, in the closest and most dangerous proximity to 4,000 hostile troopers only waiting impatiently for the order to attack!

"In a moment Schirmer's battery unlimbers on the height which commands the enemy's position, and suddenly pours down upon it a perfectly unexpected and most withering fire, which falls especially on the Brigade Murat and the squadrons which are busy watering. Major Korber's battery quickly joins the one already in action, and the hussar regiments extend themselves on either side to cover the flanks of the guns. The very first shells which fall screaming and crashing into the camp throw everything into a state of the wildest panic, and the French cavalry in a few moments fall into a confusion which is simply indescribable."

The French had made no use of their cavalry, you see, to patrol or reconnoitre towards the enemy; the German shells startled them at breakfast, as I have shown they disturbed their dinners at Beaumont, and they were absolutely unprepared for this attack. This is what the Official Account says: "At the very first round of shell the hostile cavalry fell into wild confusion. A French squadron, indeed, attempted to advance to the north of the village of Vionville, and a battery to the north-west of it, but both were unable to hold their ground against the fire of the Prussian guns; they speedily followed the rest of the cavalry, which abandoned the camp in the greatest confusion, and disappeared in an easterly direction." Then the German horse artillery galloped further ahead and began cannonading the infantry camp about Rezonville, which the flying horsemen also threw into great confusion. The horse artillery of the 6th Cavalry

Division also now pressed forward and came into action alongside their comrades in front, their fire being also most demoralizing.

Now here we have a very excellent example of the manner in which mobility, which is the distinguishing feature of a cavalry and horse artillery force, may be turned to account; and remember that the cavalry, although they might have startled the French momentarily, could have effected nothing substantial without the fire with which the guns endowed them. A few dismounted troopers might have checked them till the others could get under arms, but the infantry would soon have advanced and driven them away. As it was, these latter did rally in a short time and advanced in superior numbers against the batteries. The position of the guns was, therefore, shortly very critical, but Von Alvensleben, who commanded the IIIrd Corps, fully appreciated the necessity for fastening his grip immovably on the French flank, and battery after battery was therefore hurried on to the front, and in course of time a long line of artillery was built up which defied all the efforts of the Frenchmen, and formed a solid framework on which the infantry divisions deployed by degrees.

We cannot go into the details of the great fight, which was a very glorious one for the artillery, but its opening phases are especially valuable from our point of view this evening, and it may be confidently asserted that had the German cavalry and horse artillery not thrown themselves with such decision on the foe immediately he was found, Bazaine's army, whatever might have been its ultimate fate, would never have been defeated at Gravelotte, or surrendered in Metz.

As regards the employment of horse artillery and cavalry on the field of battle after the fight has fully developed, although at Vionville the horse artillery remained in action all day, they acted in the general line of guns, and no pedantic distinctions between horse and field batteries were made. All the guns were needed to face the terrible fire of the Frenchmen swarming to the attack with the Chassepôt, and therefore guns did not co-operate in the greatest cavalry fight of the war, when Barby's brigade made its celebrated charge late in the day. Nor do we find them in the other brilliant charges, that of the Brigade Redern, of Bredow, the hero of Tobitschau, that one which the Germans call the "Todten-Ritt," nor during the gallant rush made by the 1st Dragoons of the Guard to stem the French advance, and extricate the guns on the east of Mars-la-Tour. The principle the Germans acted upon is sound, and when once battle is joined cavalry may be used independently of guns, because they are then used in combination with and supported by the other arms, and never assail infantry unless the latter are already demoralized by fire, or taken by surprise.

Nevertheless, there may be occasions when cavalry and horse artillery moving rapidly, even during the progress of a great battle, may anticipate the foe at some decisive point, and may make or prevent a telling flank movement.

The action of cavalry supported by artillery on the head of a

column, to prevent a turning movement, was never more brilliantly illustrated than at Rossbach, where Seydlitz made his decisive charge, and the guns on the Janusberg so efficiently co-operated with him. This, however, is scarcely a modern instance, and we must forego enlarging on it. At Gravelotte, however, had the mass of the French cavalry, in place of being held aimlessly and helplessly in the rear, been placed in front of the right of the French position where the ground was favourable to the arm, they might have checked their enemy's advance, and prevented his reaching their right wing till the close of the battle.

It was on this very right wing that the decisive blow of the day was struck, and had the French not been defeated there, the task of the Germans would have been immensely more difficult than it was, for on the left their success was by no means established. Indeed, by a bold and judicious employment of cavalry and horse artillery the French right might have taken the offensive, and, with the Guard Corps thrown in to its support, such a movement must have been an exceedingly dangerous one to their opponents.

An excellent example, however, of the rapid movement of horse artillery and cavalry to assail the flank of an enemy's advance will be found amongst the incidents of the battle of Loigny-Poupry, when the effort of the Army of Orleans to reach Paris was stifled by the Bavarians, on the 2nd of December. The details of the battle afford many instances of the mobility of field artillery turned to good account, and it is a battle that deserves attentive study from an artillery point of view (Plate 1).

The 4th Cavalry Division, formed of 3 brigades of 2 regiments each, had been told off to cover the right of the 1st Bavarian Corps, under the command of General von der Tann, which was posted at La Maladerie, facing S.W. The 17th and 22nd Divisions of the Germans were moving to the support of this corps on Lumeau and Baigneux respectively, and, in order to join them, Von der Tann was ordered to move into position with his left resting on Château Goury. The French advanced against him from Nonneville, Villepion, and Terminiers, and assailed the Germans while this movement was in progress, and the 2nd Bavarian Division was deployed between Beauvilliers Farm and Goury, to resist attack, about 9.30. It will be impossible this evening to go into a full account of all the fighting, but we may say, in general, that the battle swayed to and fro with varying success for the next two hours, the German guns making a splendid stand against the repeated attacks of a numerous hostile infantry. The action of two horse artillery batteries of the 17th Division, which hurried on and came into action to the south of Château Goury just as the French were pressing on impetuously against the weakly held German line between it and Beauvilliers Farm, is very remarkable. The fire of these batteries had a pronounced effect, and checked at once the inroad of the enemy. At 11.30, too, the 4th Cavalry Division, with its two horse artillery batteries, supported by the Bavarian Cuirassier Brigade with a horse artillery battery, also moved round the French left flank, and the fire

of the guns caused them to fall back before the Bavarians, and abandon Beauvilliers Farm.

The application of horse artillery, supported by cavalry, was in this case most effective and instructive, and the mobility they displayed in moving across country was very remarkable.

The cavalry and batteries remained till 2 o'clock near La Frileuse, when their commander judged that they might make an even bolder turning movement. One brigade and a regiment were to advance towards Terminiers to cut the line of retreat of the French, the Bavarian Cuirassier Brigade was to sweep round rapidly further to the right, while another brigade was to remain in reserve; the batteries to accompany the cavalry. During the movement both brigades came under fire from French batteries, at the north-west of Faverolles and at Gommiers, and seeing no opportunity for an effective attack at present, the division was halted at Chauveux Farm. One horse artillery battery halted with the division; the other first of all came into action north-west of Nonneville. Having silenced the hostile guns opposed to them, this battery joined two horse artillery batteries which had also followed the movement of the cavalry from La Maladerie, and these three batteries then entered into a vigorous combat with the French guns near Faverolles; one squadron acted as an escort to these batteries. The French guns were soon compelled to withdraw, and then the German batteries went on cannonading the village and the French infantry. At about 3 o'clock several French cavalry regiments from the west of Guillonville made a menacing movement against the German right. The horse artillery battery at Chauveux Farm at once galloped out to meet them, and greeted them with such a hot fire that they turned and retreated. One of the batteries, also from the south of Nonneville, also moved up to within 1,200 m. of these squadrons, and opened a hot fire upon them. A second attempt made by the French cavalry to advance from the east of Guillonville was also repulsed by the fire of these batteries, and to such purpose that the hostile squadrons turned and fled from the field in confusion. The three regiments which were sent forward from the Cavalry Division to attack these bodies of cavalry were too far off when the French turned to be able to make an effective pursuit, so decisive was the action of the artillery. The batteries, having thus disposed of their antagonists, moved to a position south of Nonneville, from which four batteries cannonaded some French batteries that had again come into action on the south of Faverolles. The German accounts do not stint their praises of the brilliant manner in which these various horse artillery batteries were handled, and especially commend their wonderful mobility, both in moving forward and changing from one position to another. In some cases distances as great as 5,000 m. (more than 3 miles) were traversed at a rapid pace across country. The French accounts also tell us how much they were hampered and surprised by the sudden attack thus made upon their flank, and the commander of their 1st Division (Admiral Jauréguiberry) was so completely deceived by the bold onset that he imagined a powerful

force was threatening his left. The example is more valuable from an artillery than from a cavalry point of view, for all the honours rested with the former arm, but affords us, nevertheless, a very striking illustration of how mobility and fire effect may be turned to account during the progress of a battle.

Having thus considered the action of horse artillery and cavalry previous to and during a battle, let us turn to examine a *rôle* which perhaps offers greater opportunity than any other for the exhibition of the special characteristics of these two arms. It is during the retreat after an army has met with grave disaster, as after Königgrätz, or during the retrograde movement before superior forces when it seeks to escape to some securer position in rear, as after Quatre Bras, that a force has to rely for its safety on the efficiency of its cavalry and horse artillery, and it is on these occasions that their assistance is simply invaluable. The Prince de Ligne once said that he could not conceive how an army ever succeeded in retreating. The explanation is that it could never make anything like an orderly retreat before an enterprising foe were its movement not covered with skill and self-sacrifice by the two arms we are dealing with to-night. Perhaps I may be allowed a little licence for a moment to refer to a splendid example of this sort when I call to your minds the retreat, on the 17th June, 1815, from Quatre Bras to the Waterloo position. Wellington had to draw off far inferior forces in the face of Napoleon himself at the head of an army flushed with the victory of the previous day over the Prussians, and looking forward with confident anticipation to a coming triumph over the English, separated as they thought they were from their allies. A series of cavalry and horse artillery engagements was fought that day along the Charleroi road, and we read in Siborne's interesting letters at the end of Lord Anglesey's account, "Thus ended the prettiest field day of cavalry and horse artillery I ever saw in my life."

This is a typical example of rear guard actions, for in these the object is rather to delay the enemy than enter into a serious engagement with him, and horse artillery which can move rapidly to successive positions in the rear, fire a few rounds, compel the enemy to deploy, then limber up and gallop off again, is specially suited to such. It should thus form a continual menace to the enemy, most irritating, most impalpable, never allowing him the chance of a direct blow at it, but ever avoiding his onset and slipping from his grasp.

Occasionally, however, when it is necessary to avert total ruin, guns must be sacrificed, and, forgetting their mobility, stand rooted across the path of their foe, blocking his way without thought of yielding. The French in 1870 did not make use of their cavalry and horse artillery either to cover the advance or the retreat; for this reason, and from the nature of the German victories, which we shall deal with later on, we must go back to the war of 1866 to find cavalry and horse artillery sacrificing themselves to secure the safety of the other arms.

In modern war there is no better example of such devoted

conduct on the part of cavalry and artillery than the manner in which the Austrian cavalry and artillery staved off complete ruin from their comrades after the great battle of Könniggrätz. It is true that these guns which so highly distinguished themselves were not all belonging to horse artillery; but horse and field artillery alike covered the retreat in the manner in which we hope to see horse artillery acting, and all nobly seconded the efforts of the cavalry as though they were all linked to them in the orthodox way. Especially did eight batteries of the Reserve artillery distinguish themselves when they were brought into action to oppose the advance of the 2nd Army under the Crown Prince, and subsequently when they took successive positions to the rear to hold back the triumphant flood of Prussian success. But for the unflinching front shown by these guns up to the last moment the disaster would have been immeasurably greater. Yet, covered by their fire and the brave Austrian cavalry, Benedek succeeded in drawing off his troops, still in formation, across the Elbe, and nothing like a rout supervened on the defeat. These eight batteries lost 9 officers, 139 men, 259 horses, and 32 guns. Let it, however, not be imagined that the loss of guns was a dishonour to them. That idea, I hope, has for ever been exploded, and it may form their proudest boast that they sacrificed their guns to save the army.

And on this occasion the action of the Austrian cavalry masses was also worthy of the highest praise. They advanced boldly against the squadrons which the victors sent out in pursuit of their disorganized infantry, and it was due to them also that the shattered battalions were able to escape. Prince Kraft, who was an eye-witness of their deeds, says that had the Austrian cavalry masses not been employed as they were, or had they been absent, the whole Austrian army had been lost, and that had the Prussian horsemen, on the other hand, not been on the field to oppose the hostile squadrons, the result of the day might have been very different, and a victory been converted into a defeat.

Before leaving this part of the subject I cannot forbear to notice how, after the terrible reverse we experienced at Maiwand, the heaviest blow our prestige has received in the East since the Afghan War of 1842, four guns of our horse artillery were mainly instrumental in enabling what was left of our shattered and demoralized force to escape. Their leader was justly rewarded; everyone spoke of the splendid behaviour of the battery, and some of the men belonging to it were decorated with the Victoria Cross. But what, gentlemen, was the reward of the gallant battery itself of which we were all so proud? Like the other fine battery I spoke of in Egypt, it was broken up. And yet men prate of how *esprit de corps* may be fostered, and the self-respect of the soldier increased! Indeed, this destruction of noble traditions has gone on so uniformly in the artillery that I think it is enormously to the credit of the regiment to which I have the honour to belong that it still preserves its fame untarnished. I once stood with an officer who has now, alas! left us, in the old dining hall at Woolwich. One of the mottoes on

the wall emblazoned in old English letters caught our eyes. He read it. "Unlasting yet unresting work." "Surely," I said, "you are making a mistake, it is *unhasting*." "Is it?" he said. "I have remembered it as unlasting all my life, and it seemed such a good motto for a gunner, for it told me that I must do my best, and work hard, and then my battery perhaps would be disbanded." He did not speak cynically. The grey-haired veteran, one of the best officers we ever possessed, had bowed his head all his life to the inevitable, and had never slackened one atom of his zeal or disregarded his duty for one moment, although he knew, and probably had experienced, the reward which too often follows such conduct in our regiment. But his remark filled me with greater admiration for him than ever, and I hope I may tell you with confidence that we have many more like him, whose spirit and energy remains unbroken, even though their batteries may some day be broken up too.

There remains for us now to discuss the duties which fall to cavalry and horse artillery during the pursuit of a beaten enemy. A mere victory will effect comparatively little, if the vanquished are not so harassed and demoralized by the victors following rapidly upon them that they shall have no time, as it were, to recover breath. Napoleon blamed his cavalry, after Wagram, for their want of enterprise in this respect, and exclaimed, "This day will be without results," since neither guns nor prisoners fell into his hands to give tangible evidence of his success. Salamanca, similarly, might have been 10 times more telling a triumph had a pursuit, swift and inexorable, been launched after the French, or had the Spaniards not broken their pledges with regard to the Castle of Alba. Vittoria, Jena, and Waterloo are examples, on the other hand, of victories converted into routs, although at Waterloo the cavalry might have done more than they did. Instances of ideal pursuits are in fact rare. The best examples, too, are to be found amongst the annals of the early wars of the century. This is variously to be accounted for. Darkness closing in at the end of a hard-fought day too often prevents effective pursuit, and the victors are often too weary and sore for it.

Our force of cavalry was too weak to enable us to pursue after the Alma, or rather it was supposed to be too weak, for it is useless to deny that a glorious opportunity was then thrown away. The circumstances which surround the greatest victories of 1870 were so remarkable that they rendered pursuit unnecessary. There was, in fact, nothing to pursue, for the entire French army was in these surrounded, hemmed in, or captured. After Woerth, however, the cavalry on the German side was not sufficiently boldly handled, and touch with MacMahon was lost owing to its not having been thrown fearlessly to the front upon his line of retreat. Since we are precluded this evening from going back to what can scarcely be termed modern war for salient examples, we will content ourselves with touching on the principles which should guide us in the future. But let it not be supposed from anything that may have fallen from me just now, that there will not be ample scope and opportunity for the mobile arms in future campaigns to shine in this most essential *rôle*.

Masses of cavalry should be concentrated on the line of retreat, where the main body of the enemy is most likely to be met with. As many batteries of horse artillery should be sent on with the cavalry as possible, for otherwise a few riflemen or guns may hold the squadrons back by their fire, and it will be advantageous for them not to fight on foot, for every sabre will be needed in the work before them. A German authority,[1] Captain Cardinal von Widdern, in his "Handbuch für Truppenführung und Befehlsabfassung," recommends that some companies of infantry, well supplied with cartridges, should therefore be sent with them, carried on carriages. The Germans are, as you know, no believers in mounted infantry as we organize it, although they clearly recognise the value of a mobile rifleman; otherwise, no doubt, we should have seen mounted infantry proper referred to. The battalion of mounted infantry with our cavalry division will come in most opportunely here, and, we trust, may find a sphere of usefulness before it some day on such an occasion as a British victory. Strong patrols, formed by regiments or squadrons, as circumstances may dictate, would scour the other roads, and smaller detachments would penetrate wherever they could make their way. In all cases the addition of some guns will be extremely useful, for the mere appearance of artillery always produces an immense effect on an enemy in full retreat. The pictures that historians and correspondents have often painted of the disorganized crowds of soldiers jostling one another like sheep in the roadway, the long, slowly-moving ammunition and supply columns blocking up the path, all describe a tempting target to the pursuing batteries, and a few shells may be enough to cause whole miles of vehicles to be abandoned. The defensive power which fire lends to cavalry also gives it greater audacity, and likewise enables it, as we have said, to brush aside resistance which might otherwise prove serious; and, finally, the sound of the guns may aid their side, for, in the event of the enemy being able to assemble in sufficient numbers to bring on an engagement, it will call reinforcements in the direction where they are needed. The manner in which our cavalry took up the pursuit after Tel-el-Kebir, although rather in the nature of a cavalry raid, is a splendid example from the most modern times, but the undue weight of their equipment prevented the horse artillery batteries from accompanying the horsemen the following day from Belbeis to Cairo, as Sir Drury Lowe was most anxious they should have done, for, in the event of any resistance being met with in that brilliant and audacious *coup*, their presence would have been most valuable.

The mention of this latter feat, for, as we have said, it was more in the nature of a raid than a pursuit, leads us to the last *rôle* which horse artillery and cavalry may assume in common. I mean in those raids which were a famous feature of the American War, and have ever supplied a field for the energy and capacity of a genuine leader of cavalry. Such rapid enterprises may be undertaken for the sake of gaining information, cutting an enemy's communications, or capturing supplies and stores. We find an excel-

[1] Quoted in Trench's "Cavalry in Modern War."

lent example of such an operation in the reconnaissance or raid effected by General Gourko across the Balkans in July, 1877, when in eight days he carried dismay into the heart of Turkey, destroyed parts of the railroad and telegraph on the principal lines, and gained a great deal of information as to the Turkish movements. On that occasion he had a mixed force with him, but there can be little doubt that had he had mounted infantry at his disposal, as the leader of one of our cavalry divisions will in the future have, he would have availed himself of their services. In such rapid operations there is clearly a wide field for the co-operation of horse artillery and cavalry.

During the American War of Secession such raids were freely undertaken, and the exploits of Stuart, Forrest, and Morgan are justly celebrated instances. But these leaders conducted their operations rather after the manner of irregular than regular warfare Their principal object was to elude observation, not to fight, and, therefore, extreme mobility was desirable. Consequently guns played only a minor *rôle*, and there was latterly a tendency to dispense with their services altogether. A salient instance of this nature of fighting may be found in General J. E. Stuart's raid in front of Richmond in 1862, when with 1,200 men and two guns he unexpectedly burst into the Federal lines, and gained a quantity of information that was of the greatest value in the subsequent operations. With impudent audacity he swept completely round the rear of his opponents, cut their communications, burnt and destroyed a vast amount of stores and property of various description. He returned in 48 hours with the loss of only one man, having captured 165 prisoners and 200 horses and mules. The dashing cavalry leader will probably again in the future thus turn the mobility of his arm to account, and the value of a force capable both of fire effect and rapidity of movement will again be exemplified.

With this last reference to a sphere in which the usefulness of a combination of cavalry and horse artillery will certainly find employment I must close my remarks to-night. I have only had opportunity to touch very briefly on the various aspects of the tactics we have been discussing, but I trust I may have said enough to show you that as much will be expected from the arms of the Service we have dealt with in the future as in the past, and perhaps even more, On the battle-field itself, we can hardly hope to see cavalry, as in the days of Ziethen and Seydlitz, deciding battles by their action, although we may note in passing that the most modern battle, that of Placilla, was won in this way, but before great forces are locked in a decisive struggle, there must be many opportunities for the arm still. Frederick said that for every day of fighting there were twenty of marching, and that is so now as it was during the Seven Years' War. Therefore cavalry and horse artillery should be regarded as the same, for the arm that can move and strike also can never be at a discount, and the side well served by it will reap far-reaching benefits and advantages that will seriously influence the progress of its operations.

THE RISE, DECAY, AND REVIVAL OF THE PRUSSIAN CAVALRY.

By Captain F. N. Maude, late R.E.

The principal cause which, to my mind, leads to the extraordinary confusion of thought that exists in the domain of tactics, not only in England, but elsewhere, is that we attach a constant value to names denoting things which, in their nature, are essentially variable. This is especially the case in all discussions as to the relative power of cavalry and infantry. The cavalry enthusiast sees in his mind's eye perfectly-trained and fresh squadrons bearing down in extended gallop, with well-closed files, over level ground, on exhausted, demoralized infantry; or, more often does not reason at all, but picks up from some text-book instances in which cavalry have been successful, never stops to inquire the cause of their success, but jumps to the conclusion that if they only ride home they will always be equally fortunate. The infantry enthusiast, on the other side, views matters in an exactly contrary direction. To him, the squares or lines await the onset of the blown and disordered cavalry in perfect coolness, and a couple of volleys suffice to empty every saddle; and if he is a Briton he points with pride to the bearing of our troops at Waterloo, or to that exceptionally daring advance with the bayonet of the 5th Fusiliers at El Boden and its successful result, forgetting to inquire what kind of cavalry it really was which we there encountered.

The truth really lies between the two extremes; but as a means of testing the value of the historical occurrences on either side we are sadly in want of information from whence to gather an approximation to the actual conditions under which the two arms really met; and further we require to know, as a means towards securing the tactical efficiency we desire, what causes actually have led from time to time to the success or failure, more especially of the cavalry arm.

As a rule such information is most difficult to acquire. I have been utterly unable to find any reliable record of the evolution of our own cavalry, for our regimental histories, though brim full of personal incident and adventure, never give a page to these really essential matters, and French military history is equally deficient; even Marbot tells us very little about them; all alike forget to mention what the standard of efficiency really was, or how it was judged, and failing these points of support it is impossible to construct an estimate.

Only in Prussia can one obtain the desired information, and even here there are gaps in the history very imperfectly closed.

What one has always wanted to know is how it came about that, whereas in the Seven Years' War Prussian cavalry broke almost all they rode at, 50 years later the cavalry of the same nation failed nearly invariably against the same infantry weapon; and again why, after the comparatively trivial results achieved by the German horse in 1870, 22 years afterwards, and in spite of the immense improvement in the mechanical perfection of the weapons which has since taken place, the leaders of cavalry opinion in that country claim that they will revive the glories of Ziethen and Seydlitz in the coming war.

The key to these questions will, I hope, be found in the following lines. The evidence is by no means as perfect as I could wish, but I trust it may suffice to set other minds working at the same problem.

The state of the Prussian cavalry at the commencement of the first Silesian War may be gathered from the new official history of that campaign published in Berlin last year. It was far from perfect, and did not particularly distinguish itself. At the beginning of the Seven Years' War it had much improved; younger and more talented leaders were rapidly coming to the front; but throughout the whole campaign it constantly suffered from the evils of new formations, and its ranks had to be flooded by recruits and remounts to make up for the heavy drain, the necessary result of the war; still even under these conditions it achieved unequalled successes. No nation can boast of a more startling victory than Rossbach, achieved in half an hour by Seydlitz and his 33 squadrons over 50,000 French and allies; and the claim of the cavalry cannot be disputed, for the Prussian infantry brought only seven battalions into action, of which two expended between 12 and 15 rounds and the remainder but a couple of rounds apiece; and the artillery—18 guns—only fired for a few minutes. Zorndorf, which would have been a Prussian defeat but for the cavalry, and Hohenfriedberg, with the celebrated exploit of the Baireuth Dragoons—six squadrons strong, who brought in 69 stands of colours besides guns and prisoners—these are too well known to require further mention.

What principally concerns us is what happened to this arm after the war, during the 50 years which elapsed between the victory of Rossbach and the catastrophe of Jena.

At the conclusion of peace its efficiency rose rapidly. Though reductions were made, these were chiefly effected by drafting out the worst horses and men.

Very few of the original rank and file can have survived the campaigns—that is to say, have failed to achieve promotion—so that the cavalry must then have been an ideal force—all the privates in the prime of youth and strength, all or nearly so with two or three years' war experience, and the whole led by officers who had won their rank before the enemy with the greatest cavalry General the world has ever known as their inspector.

I have repeatedly seen it asserted in German works, and can well

believe it, that during the following nine years the Prussian cavalry reached their absolute zenith, and that the arm has never really been seen on any battlefield in such perfection as they had then attained.

Now begins the decadence; and it appears to me that its history throws a strong side light on many difficulties with which of late we have ourselves had to contend.

Since with men in the prime of life the death rate was necessarily low, very few recruits were accepted, and these were handed over to a drill-sergeant per squadron. It was not worth an officer's while to go out and see half a dozen men drill.

Young officers, as they joined, drilled with the recruits, as ours do still, till dismissed, but then ceased to have any particular incentive to further study. What influence could they exert, or what could they teach the war-worn veterans before whom they were privileged to ride? They were mere children by their sides and probably felt it. All amongst us who joined in the old long-service days must remember a feeling of the same kind. Then, out of our own experience, we also know that the vast majority of men who have acquired their own knowledge by practical action very generally forget the difficulties they encountered when they first started. By practice they grew insensibly out of the stage of complete ignorance without even noticing their own progress. Now that they have knowledge they forget there was a time when they had none, and cannot put themselves in the position of the young officer who has no longer, in a state of peace, their opportunities. Everything to them seems so much a matter of common sense that they cannot conceive the necessity of teaching their juniors how to post a piquet or conduct a patrol. A young officer growing up with long-service soldiers does not appreciate the difficulties either, for they carry out all minor duties by tradition and custom, excellent as long as the real war-experienced men remain.

But there comes a time when medals are conspicuously absent in the front rank, and tradition has been degraded into rule of thumb. War seems very distant and the inspection very near. The more ambitious and practical an officer is under such circumstances, the more certainly will he devote his time and energy to the practice of movements which will tell in the latter. If then the inspecting General is wanting in activity and knowledge, the doom of any arm, but more particularly of the cavalry, is sealed.

And there is yet another rock on which long-service soldiers are apt to split. Troops once thoroughly trained and disciplined, men and officers fail to perceive any object in the constant repetition of movements long since familiar to them. A couple of parades a week are ample to keep the men in form, and more only makes them sulky. Thus the element of laziness creeps in, becomes in due course traditional, and ultimately proves the hardest bad habit of all to eradicate.

War inevitably tends to decentralization and to habits of self-reliance in the junior officers; peace as inevitably to the reverse.

Since with old drilled soldiers, who practically work themselves, there is very little for captains and subalterns to do, they take as

much leave as possible, and the command of the whole becomes centralized in the colonel and sergeant-major.

All these factors tended to the disintegration of the Prussian horse, and there were yet others more peculiar to them at work.

Owing to the heavy losses of the campaigns, all who survived, men and officers alike, came out much about the same age, and, as a consequence, they all grew old together.

Now, as a fact that I can vouch for, from personal observation, the Prussian, and, indeed, the German, ages much more rapidly than the Englishman, particularly in the higher classes. Very few Germans indeed, even nowadays, maintain their figures and activity over 40.

When, therefore, Seydlitz died, and the junior captains averaged some 20 years' service, there being no longer the example and pressure of an exceptional man at the head, the elderly gentlemen who commanded regiments and squadrons found it easier and much less exhausting to judge the efficiency of their commands in the *manège* or by watching an occasional charge from a flank than by riding in front of their men in the open field; and as Marwitz, on whose journal this article is principally based, very rightly points out, this was the beginning of the end. In the old days charges were judged from the front; the men prided themselves on riding boot to boot; his own regiment, the Gens d'Armes, went even further, and their particular swagger was to ride knee behind knee. Accurate dressing was thereby rendered out of the question. The charge was, as already stated, judged from the front, and if that was closed and unbroken everything was well. But, when judging from the flank came in, the correct alignment began to be considered the main thing, and this could only be attained by allowing the ranks to open when the gallop sounded; and so it came to pass that the descendants and survivors of the old Frederician cavalry, attacking at the gallop, were ridden through and dispersed by French cuirassiers, who moved only at the "trot," but "closed up."

In addition came the troubles introduced as a consequence of the absolute necessity for economy.

Marwitz's description of his own regiment, the Gens d'Armes, with whom he served for 13 years, will sufficiently illustrate this point.

"Our strength was 10 troops (companies they were then called), each company consisting of 66 privates, without counting N.C.O.'s, of whom half were on furlough, and were only called up for the drill season, which lasted from the 16th March to the 23rd May, nine weeks in all.

"Out of these nine weeks, only three were allotted to riding in the school, and each man rode for an hour a day, or 18 hours in all."

It must be admitted that 18 hours is not too much for a man who, for the rest of the year, was engaged at his trade in the fields, or in the workshops. (I must add that Marwitz is here defending the old regiments from spending too much time and attention on equitation only, instead of on more "practical" work.)

"Then for three weeks to the time of the 'special review,' the regiment went out to drill on alternate days, so that the man again mounted his horse nine times.

"After the 'special review,' a number of the men were again sent on furlough, only enough remaining to enable us to go out to drill with 24 files per troop, and these few men mounted their horses nine times in all.

"In the autumn we had another three weeks' drill, but only with 20 files per company, and no individual riding at all. Hence it follows that, at the outside, no furlough man had more than 18 hours' riding drill, and only mounted his horse for drill in the ranks 27 times, and no one who knows what the difficulties of the business are will contend that this is too much time to bestow on such an all-important matter.

"But it may be asked, How was it with the remaining 33 duty men, surely they must have been perfect centaurs? Unfortunately from these we must deduct the recruits and 'freiwächters' (men struck off all duties, and allowed to work at their trades in the town). There were 10 of the latter allowed by regulation, and as a body they rode worse than the furlough men, for they only turned out when the regiment paraded at its full strength, and never went to riding drill at all.

"Of recruits there would be an average of eight annually, and since two years is the least time in which it is possible to make a horseman, there were at a time 16 men undergoing their training; so that of the 33 only seven remained from whom one could with reason expect that they should ride perfectly.

"Of horses, each troop had 75, and received every year eight remounts. As the latter joined very young, they could not be put in the ranks under three or four years: 24 must therefore be subtracted from the available strength. But, amongst the horses dismissed by the riding master, there are always some which, owing to defective shape, weakness, or trifling unsoundness, can never be regarded as capable of perfect training. Take these at a seventh of the whole, and we must deduct another 10. Finally, a certain number had to be set apart for the recruits, and these it was impossible to train perfectly, for they passed from the hands of one recruit to another, and as every recruit had to ride daily, we must deduct *two* for each, or in all 16 horses (I am following Marwitz exactly), so that for the whole troop there were necessarily 66 part trained, and could only be nine horoughly trained horses.

"Is this overdriving the art, when by no possibility could there be more than seven trained horsemen out of 66, and only nine thoroughly broken horses out of 75, when this art is the one mainspring of efficiency of the whole?

"The outcry simply arose from the fact that, when anyone saw a selected detachment ride in the school, he was astonished at the performances, and easily came to the false conclusion that the whole regiment had attained the same degree of skill"—a point, by the way enthusiasts for Agricultural Hall displays would do well to

note. As long as the efficiency of a given regiment is all that a competent Inspector-General says it should be, there is no ground for complaint, for the best regiment will turn out the best riders; but when, as sometimes happens, the whole routine of an underhorsed regiment is sacrificed in order to make a show before the public, even with the laudable desire to obtain recruits, it is time for a critic to step in and show the injury actually being inflicted on the Service.

Under the conditions above indicated, the Prussian cavalry degenerated fast. The King knew all about it, but when Seydlitz had gone he had no one to help him, and, overwhelmed by the stress of work he had voluntarily taken on himself, he could only now and again find time to give them an occasional scolding. One of these, delivered at Potsdam, Marwitz has preserved word for word, and, as it explains a very great deal, I give it *in extenso*.

"Gentlemen," he said, "I am entirely dissatisfied with the cavalry; the regiments are completely out of hand; there is no accuracy, no order. The men ride like tailors; I beg that this may not occur again, and that each of you will pay more attention to his duty, more particularly to the horsemanship.

"But I know how things go on. The captains think only of making money out of their squadrons, and the lieutenants how to get most leave. You think I am not up to your dodges, but I know all, and will recapitulate them. To-morrow, when you start on your march back to your garrisons, before you are 10 miles away, the squadron commander will ask his sergeant-major whether any of the men live in the vicinity, and the sergeant-major will reply, 'Yes, Sir, there are So-and-so and So-and-so who live quite close here, and would be glad to get furlough.' 'Very well, then,' the captain will say, 'we can save their pay. Send the names to me to-night, and they shall all have it.' And so it goes on every march. The subalterns get leave to visit their friends, and the captain arrives at his garrison with half the squadron mounted, leading the horses of the other half, like a band of disreputable Cossacks.

"Then, when the season for riding drill comes on, the captain sends for the sergeant-major and says, 'I have an appointment this morning at So-and-so; tell the 1st lieutenant to take the rides.' So the sergeant-major goes to the senior subaltern, and gives him the message, and the latter says, 'What! the captain will be away, then I am off hunting; tell the 2nd lieutenant to take the men.' And the 2nd lieutenant, who is probably still in bed, says, 'What! both of them away! then I will stay where I am; I was up till three this morning at a dance; tell the cornet I am ill, and he must take the rides.' Finally the cornet remarks, 'Look here, sergeant-major, what is the good of my standing out there in the cold; you know all about it much better than I do. You go and take them.' And so it goes on, and what must be the end of it all? What can I do with such cavalry before the enemy? I tell you I think so much of the importance of your arm, that I expect more from a lieutenant of cavalry than from a major of infantry. When I visit the outposts I expect every subaltern in charge of a piquet to be able to tell me exactly all

about the ground for five miles round, and be able to make an intelligible sketch of it." (Frederick's standard, by the way, was not very high, and some of his own topographical work, recently republished in facsimile, would certainly have entailed his failure in "C" and "D.") "If I send him on a patrol, he must be able to tell me exactly where, and how strong, the enemy is, and how best to get at him; what the roads are like, and whether I can move guns by them, &c.; and when the time for the charge arrives I expect you all to seize the opportunity, and not wait for orders, which always come too late.

"You see how high an opinion I hold of your service. Now go; attend to your duties better; and don't let me have to speak like this again."

Nothing could show more graphically how far the Prussian horse had fallen. Still, they preserved a few of their traditions. One instance—that of his first appearance on parade—Marwitz quotes; it took place about the same time, when he was still riding as a recruit in the ranks. He had been given a great raw-boned animal, with no mouth to speak of, and when the charge sounded he broke the ranks, and tore past the colonel into space. "For this I should have deserved the 'fuchtel' (corporal punishment with the flat of the sword), but in consideration of my youth, and the obvious physical impossibility of holding the horse (he was then a very little fellow, about 15 years of age), I escaped with a reprimand."

This at least shows that knowledge of horsemanship was still traditionary in the service, for it implies that the art of acquiring complete control over the horse existed somewhere; otherwise breaking the ranks would have become too common to notice, and impossible to punish, for when in a whole regiment no man can show another how to hold a horse, punishment cannot be justly awarded to an individual who fails to do so. I remember seeing a certain hussar regiment, on inspection in the Long Valley, break up and squander when charging, with at least half the men out of the ranks. The event was specially impressed on me, since these disbanded warriors tore through our own intervals, we (the R.E. troops) being drawn up for inspection also on Clay Cart Hill. Even the formidable obstacle of Scrogg's Bottom could not check their impetuosity, and we saw many riderless horses emerge from it on the other side. Three men were picked up with broken legs, to the best of my recollection.

To return to the story. The causes of the failure of the Prussian cavalry in 1806 were principally these:—The distribution of the cavalry in small bodies to the infantry divisions; the want of uniformity in training, which prevented the few larger bodies that were retained together from delivering a proper charge; and want of dash and pluck in a great majority of the old long-service peace-trained soldiers. Though individual squadrons behaved magnificently, there can be little doubt that as a body they funked the French, and they funked not because they were individually less brave, but because as a consequence of the long-service evils above pointed out, they had, as a rule, no real confidence in their leaders.

The efforts made during the ensuing years to create some kind of

cavalry fitted to cope with the French are of the greatest interest, for here we can see whence many of the false ideas on cavalry and cavalry training had their origin.

Owing to the appalling losses in men and horses suffered by the French as the wars continued, the efficiency of their cavalry rapidly fell, till, in individual instances, hastily-raised Landwehr squadrons obtained local successes.

Yet the moment it came to united action of larger bodies the failure was complete, as at Ligny. Blücher was so disgusted with their performances on that day that he wrote a very severe despatch, which was felt by one commander of an irregular corps to reflect on the personal courage of his regiment, and he called the old Field-Marshal out. It hardly needs to be said that the challenge was declined, but the whole event caused considerable stir, and Marwitz took up his pen to defend the action of the Field-Marshal by showing that the failure was by no means due to want of courage, but to the fact that owing to the gradual extinction by age of the old Seydlitz scholars, the elements of cavalry efficiency and training had been forgotten.

His pamphlet is one of the most suggestive and able to be found in the whole range of cavalry literature, and, as it raises many points which are of direct application to our existing system, it will not be out of place to *précis* it at considerable length. His first question is: "What are the elements which make an efficient cavalry?" and his second, "Were these elements in existence in the Prussian horse of that day?"

"These elements are partly moral, partly physical, in principle; they are analogous to those which constitute the strength of a good infantry, but their application is infinitely more complicated because they depend on the co-operation of two living organisms—the rider and the horse. The moral elements are personal courage in the individual and *esprit de corps* vivifying the whole mass.

"The physical ones are soundness and condition combined with 'horsemanship' in the ultimate unit—the horse and his rider—and mobility and precision in all fixed movements in the whole body.

"The words of Blücher's report have been taken by the other arms to imply a deficiency of personal courage in the individuals of the cavalry, but this view is untenable, because the recruits of the mounted arm come from the same class as those of the infantry, whose courage nobody questions, and all were equally imbued with the same love of country and the same desire for revenge. It is ridiculous therefore to assume that all the brave men joined the infantry whilst all the cowards elected for the cavalry. The reason for our failure must lie deeper than this, and we will return to it when we have dealt with the other points.

"*Esprit de corps* is a virtue which requires a 'body' in which to manifest itself. Where it exists it raises the courage of the individual through the confidence he feels in his comrades, and the dread of their ridicule should he prove himself unworthy. Honour and shame are more keenly felt by the mass than by the individual, and when, as in the last two years (1813–15), the desire to sacrifice oneself to

achieve the liberation of the Fatherland has inflamed every heart, it can by a judicious choice of means be made into an almost irresistible moral force. Were these judicious means adopted in our cavalry?

"The officers are the representatives of the men, the true pillars on which regimental tradition, which is almost synonymous with *esprit de corps*, rests. If it dies out among them it cannot live long among the lower ranks except in a perverted form, which in time may react most perniciously on the officers, giving rise to a spirit of exclusiveness and *regimental self-righteousness* which may cause most serious embarrassment to the army leaders by the friction it entails in the execution of orders.

"As a consequence, the members of a body of officers must be relatively numerous, so that the seed may take root in them and the public opinion of the majority be able to compel the obedience of individuals. In a body of from 10 to 20 members only, a healthy *esprit de corps* can scarcely exist."

I may here note that Marwitz never contemplated such overgrown bodies of officers as the R.A., R.E., or the Indian Staff Corps, though the two former have maintained their regimental traditions to some purpose. From 40 to 60 was the limit he had in mind, though the limit might be increased to, say, 100.

"The officers must belong for a considerable time to their regiments, so that they learn to look on the regiment as their home. For a corporate spirit is opposed to the promptings of selfishness, and if men live long enough together no personal consideration will induce a man to cut the ties which bind him to his brother officers. But, if you wish to destroy this collective spirit, then move your officers constantly about so that they never have time to form these ties. You may thus evolve men of ambition fit to be leaders, but you will have no regiments in the true sense of the word for them to lead.

"The observance of these rules is all the more essential with troops of new formation, such as ours have been during the recent wars; for when no time has been given for *esprit de corps* to form among the men, the officers become its sole supporters.

"With regard to the men, the same principles require strong regiments. Better fewer strong regiments formed by the expansion of weak cadres and inheriting the traditions of their names and colours, than many weak ones formed new from colonel to trumpeter.

"The number of officers in our cavalry regiments is too small—only 23, and that total is rarely maintained. They have been too frequently interchanged, and notably before the commencement of the last campaign whole regiments were denuded of their leaders, who were distributed throughout other ones.

"The regiments are in themselves too weak, and the formation of some more by taking a squadron from each and grouping every four of these squadrons to form a new regiment was a blunder of the worst kind at a time when we were almost in face of the enemy.

"Hence of all the elements that go to the formation of a true *esprit de corps* not one existed, nor in the nature of things could exist, in the Prussian cavalry when we last took the field.

"Of courage and zeal in the individuals there was as much as in any other body of troops, but of the habit of mind which can combine these qualities into a useful whole, and which alone renders the regiments and squadrons reliable tools in the hand of their leader, there was not, and could not be, a trace.

"Coming now to the physical qualifications, and taking first the soundness of man and horse—considered as an indissoluble unit—it is the case that the great majority of our horses were radically unsound. After 1812, when the few remaining suitable horses had either died in Russia or been ruined by overwork, we had to collect an enormous number of animals to reconstruct the cavalry, and there was not time enough for suitable selection even had horses existed in sufficient numbers. We had, in fact, to take what we could get—old riding horses, carriage horses, cart horses, whatever the French had left us. All these, whether already broken-down horses or young untrained ones, had to be mounted by recruits who could not be expected to, and certainly did not, understand how to save their mounts, by bringing the strain on the stronger and sounder limbs and muscles and saving the weaker ones. In two rapidly-conducted campaigns, including the last one in winter, the forehands of almost all the surviving horses were ruined. They became so hopelessly wooden in the forelegs that one can characterize the whole lot with absolute conviction as entirely unsuited for cavalry purposes. And during the few intervening months of peace we received only a very small percentage of remounts, and then were compelled to take the field in a most unsatisfactory condition as regards soundness.

"As to the usefulness of man and horse combined, the standard was an exceedingly low one, and for the following reasons:—Taken together, the usefulness of the unit (man and horse) depends on this, viz., that the man is able to take his horse at any desired pace in any direction, and over any ground; and under all conditions is able to use his weapons with effect against the enemy. The art by which these purposes are attained, and which on the one hand develops the strength of the rider, and on the other secures that the powers of the animal are made the most of by saving the weaker and working the stronger parts of his frame, is termed *horsemanship*.

"An unbroken horse, as long as he remains in that condition, is useless for the above purposes. A rider who does not know how to control the movements of his mount, to the extent needful to obtain the amount of control indicated as essential, is nothing more than an unfortunate surrendered to the uncontrolled impulses of a timid, yet dangerous, beast. Now during late years the art of horsemanship has become extinct in our cavalry. The horses are no longer under the control of their riders. When one wants them to gallop, they bolt; when they are required to stand still they turn about, because they do not understand what the pressure of the leg is intended to indicate. If one requires them to leave the ranks or to leave other horses, they decline to do so or run up against the others; in short, they obey their own untutored instincts instead of the will of their riders.

"The young soldier on such a brute is indeed in a pitiable state, for he has to submit to the animal's moods without knowing how to control them; compelled to do the best he can, as far as his strength permits, he jobs the poor brute in the mouth, sticks his spurs into him, and at length brings him into a state of desperation worse even than his own. For the *aids* he employs are almost always the wrong ones, and only encourage the horse to resist, not to yield himself. That such a man, entirely occupied with his horse, and being carried whither he knoweth not, is in no position to make use of his weapons, is self-evident. He is therefore useless as a cavalry soldier. But this, in the main, is the condition of our cavalry.

"I do not say that every rider is so helpless, for that is nearly impossible, and, if they were so, all hope of improvement would be at an end; but I insist that the above accurately represents the condition of the majority, and, though some regiments are better than others, yet, as a body, they are all more or less in the same boat.

"As an old and experienced cavalry soldier, I say that the art of horsemanship is so far lost that, in the whole army, there is hardly a single young officer left who understands how to train horse and rider from the beginning upwards. If we go on at the present rate, then, with the last of the old squadron leaders, the art will finally disappear from amongst us.

"A new view of the matter has crept in since the time when our cavalry first began to deteriorate, and perhaps the cause of its origin lies in this very deterioration. This view, namely, is, that horsemanship is unnecessary for cavalry; courage, the reins loose on the horse's neck, a sharp pair of spurs, these are the only necessary elements of success in the field; so alone can one count on the overthrow of the enemy.

"This idea at once stamps the school whence it arises as no cavalry soldier's. A man on a horse who cannot ride will only then succeed in driving his horse into the enemy's ranks, by letting go the reins and sticking in his spurs when the horse is either blind with terror, or so fresh, from over-feeding or standing in the stable, that he runs away from sheer light-heartedness. Under all other conditions, when wearied with the long marches necessary to meet the enemy, he never goes straight for him, but always tries to run away in an arc until his head is turned towards his last night's quarters.

"Whoever has ridden in a charge which the enemy attempted to face knows for certain that no single horse of itself ever desires to face the collision, but that rather they all pull up and try to turn away from it.

"If the charge is to succeed, then the rider must compel his horse to maintain the direction. The French try to prevent this inevitable tendency by closing the files so tight that the horses cannot turn round, and advancing so slowly (at a trot, sometimes even at a walk) that the line cannot open out.

"The opponents of horsemanship base their case on the fact that the French, whom they admit to be execrable horsemen, have never-

theless, on occasions, succeeded, ignoring that it was by this method that they did so, and from isolated occurrences have established a principle, without troubling themselves over such details. Strangely enough, though many people will admit their deficiencies in other arts, such as dancing, fencing, swimming, and so on, no one will ever allow that he cannot ride. He may go as far as to confess that he is not a school rider, but he gets out of that by saying that he considers school riding, *i.e.*, horsemanship, as of no account. He gets to the place he wants to somehow, and he does not fall off, and that seems to him sufficient. One's eyes tell one that he ought to fall off a dozen times a day, if he were not careful to avoid the risks which a cavalry man between his comrades has to take as they come, for it is evident his legs are in the wrong place to control his horse's movements, and he is entirely at the mercy of the animal. Many a horse has been rejected by him as vicious and untameable because it refused to stand still when its rider was applying aids to make it go on; and, after many disappointments, he has perhaps got together three or four animals gentle and long-suffering enough to allow him to do what he likes on their backs, and he is then satisfied. He can ride, not school-fashion perhaps, but he can ride.

"Such a man forgets that a cavalry soldier cannot choose his own mount, but must take what is given him, and can never avoid the opportunities of falling off that present themselves, but must at all times be ready to go where he is ordered on the horse provided for him.

"The horse is a living machine which the rider controls at his will; but, just as little as a machine can go of itself, but is at all times dependent on the knowledge of the man who employs it, so little also can a horse be managed by one who has not been taught how to do so.

"From the above it is clear that our cavalry has decayed for two reasons: first, because the horses were not trained, or had become broken-down past training by the service, and, secondly, because our men could not have ridden them, with the training they possessed, in any case.

"Next comes skill in field movements. Perhaps after what has been said above it may seem unnecessary to enlarge on this point, for how can a cavalry possess skill in combined movements when the individuals are in themselves useless? But it will throw additional light on the subject if we investigate a little the conditions which the field movements of a good cavalry ought to satisfy.

"These conditions, briefly stated, are mobility and vehemence in the charge.

"But the two conditions are in themselves contradictory. Mobility is most easily obtained with light men on small active horses, vehemence in the charge by men on powerful upstanding ones, and you cannot easily combine the two.

"If Nature had made all men of one weight and all horses of the same size, such a combination might be possible; but, since men and horses are not all cast each in the same mould, the best way out of the

difficulty is to sort them out in at least two, possibly three, different classes of cavalry—light, heavy, and medium—and give to each its special drill regulation, which should develop the pace and vehemence of the heavy branch to the utmost and the certainty and power of overcoming all obstacles in the light cavalry to its extreme limit.

"A cavalry neither vehement in shock nor rapid in its movements is practically useless; it would be better to spend the money they cost on infantry only. For the foot soldier is more independent; he has no horse to get hungry, sick, or lame; and, as long as his strength holds out, no obstacle is altogether insuperable to him; whereas external influences constantly impede the horseman. If, therefore, I sacrifice these two advantages of vehemence and mobility, and accustom my heavy cavalry to charge only at a trot or walk, as the French do, or my light horsemen to find an insuperable obstacle in every ditch and fence they meet with, I should do better without them altogether, preserving only a few mounted men to carry orders and perform a little perfunctory scouting.

"But how will it fare with me in a war with an enemy who possesses a numerous and determined cavalry, rapid and quick in manœuvre, and I meet him in an open country? History gives the answer—and it is not an encouraging one.

"Cavalry, therefore, is essential; and, if essential, then it follows that it must be trained to develop those powers in which it is superior to infantry to the highest limit possible: the light cavalry, especially, in rapidity of movement across country independently, the heavy, in pace and vehemence in the charge.

"Rapidity of movement is, however, not merely a question of reckless galloping about; such a course only ruins the horses by uselessly wasting their strength. The true art consists in handling the horse in such a manner as to save him as much as is consistent with the object to be attained, and next, in a drill which permits of a desired movement being executed in the least time and by the shortest line. The vehement charge, the special province of heavy cavalry, requires the fulfilment of two conditions, viz., pace and closed files; the latter with the special object of uniting, by the pressure inwards, the momentum of the individuals into that of the mass.

"Our cavalry is incapable of either form of action; it can neither get about, or charge boot to boot. Its drill regulations are modelled on those of the infantry. Common sense would indicate, with arms having such widely different methods of action, that the same forms of drill cannot possibly be common to both. Things have got to such a pass that a regiment of infantry now manœuvres faster than one of cavalry. Those who do not believe that our cavalry is now-a-days slow, because they adopt the French standard, should look back 26 years or so, and recall what our drill used to be when the traditions of Seydlitz's days were still with us.

"Our charges are ridden too loose. This dates from the time when, on the drill-ground, charges began to be judged from the flank instead of from the front. The criterion of good charging is now

held to be perfect dressing; but perfect dressing with properly closed files is only possible with perfectly trained men and horses, neither of which we at present possess. Since the inspectors would have it so, it has become the custom to open the files, so that now one may see even a cuirassier regiment charge with a horse's width between the files; and hence it has happened to us that we have been overthrown in the charge by the worst cavalry in the world, which possesses only the one qualification of sticking to one another, knee to knee, at a trot or walk."

I have dwelt at length on this pamphlet of Marwitz's partly because it is one of the soundest works on cavalry questions with which I am acquainted, and can be applied to our own circumstances to an extent that each reader must decide for himself, partly also because his writings are the principal connecting link between the present and the past of the Prussian cavalry, and have since proved of almost inestimable value, freely admitted, in the regeneration of the arm during the past 70 years.

For yet darker days were at hand for the Prussian horse.

The same causes already detailed, which acted so injuriously on them after the Seven Years' War, were soon at work after Waterloo, and they worked all the more rapidly because, in the first place, the prestige of success was principally on the enemy's side, and, secondly, there was no Seydlitz, and no King, to keep the men and officers together.

In addition to the reaction which inevitably followed the long years of strain, there was the trouble that only a very few men indeed, such as Marwitz, had ever seen a really efficient cavalry, and, as he points out, the traditional methods of training man and horse were dead.

Blücher, though an ideal leader in action, was both too old and also, even when at his best, had never understood the reasons of his success. He could handle the finished weapon—none better—but he could not forge one to answer to his hands.

The then King's knowledge was limited to the number of buttons on his cavalry men's different orders of dress—no small feat of memory, considering their diversity; and, to crown all, the offices of Inspector-Generals of Cavalry had lapsed.

Till the appointment of Prince Frederick Charles, in the winter of 1866–67, the efficiency of the Prussian cavalry was judged by infantry Generals, for the most part, and only that was needed to complete its ruin. For N.C.O.'s, horses, and officers all grew old together; the men under the three years' service system of course were constantly changing (this, together with the fact that the Prussian troop or squadron leader's commission renders him personally responsible for the efficiency of his command, proved ultimately the salvation of the whole); and the stagnation of promotion became such, that instances are on record of father and son both serving in the same squadron as lieutenants, and, as far as age goes, many a regiment might have been commanded by a great-grandfather as colonel, grandfathers as squadron leaders, fathers as senior and sons as junior lieutenants, provided that the family was sufficiently prolific. Under such cir-

cumstances, it is needless to add, the tendency to judge charges from a flank and the efficiency of the squadron in the *manège* became exceedingly pronounced.

Now school horsemanship, though an indispensable part of the education of the cavalry soldier, is the veriest pitfall for the elderly and lethargic squadron leader that can be created, more especially if the squadron leader himself has never been taught to ride.

Thanks to the docility and intelligence of the horses, such wonderful results can be obtained, given sufficient time, even by a fundamentally vicious system, that the man who has never himself been trained to understand the actual requirements of field service, and is now too old to learn, habitually mistakes the form for the spirit, and is satisfied by results which, though they may do well enough for the musical ride standard, are worse than useless for the field.

Von Rosenberg, now Inspector-General of Cavalry, wrote, some years ago, a short pamphlet on cavalry equitation, which has since proved the starting point of the new regeneration, in which he quotes a characteristic utterance of an authority (von Elpons) on the system of equitation in vogue between 1825 to 1845, which exactly stamps the tendency of the day. I give it with Rosenberg's remarks: "Many of von Elpons's pupils had complained to him how difficult it is to understand the Prussian riding regulations," and to this he replies, "This expression, often uttered with sad resignation, always filled me with a certain secret satisfaction." "Obviously," says Rosenberg, "he was of opinion that the object of instruction was not to impart light and leading, but to disseminate darkness and obscurity, a view characteristic of a certain school of instruction in military sciences in all times. Conscious of their own ignorance, their efforts have always been to avoid being found out, and with this object they have adopted the policy of the common cuttle-fish, who exudes ink to delude his pursuers. These we shall have always with us."

As a fact, the old Prussian riding regulations were by no means difficult to understand by men trained in the right spirit to appreciate them. The difficulty only began when the inspecting officers demanded results from their application which they were never intended to supply.

It was in vain that General von Wrangel, and the two or three others who thought with him, endeavoured to keep alive a true standard of efficiency; they were not backed up by their sovereign, and the average inspecting officer, being too frequently an infantryman, was more easily pleased by circus tricks than by true horsemanship.

Now it was very much easier for the old gentlemen who then filled the rank of squadron leader to potter about the riding school on foot than to spend five hours every day in the saddle handling their commands at speed; they were therefore only too happy to meet the inspecting officer's wishes half way. Thus it came about that, about the middle of the forties, the squadron leader who could take his squadron past the saluting base at the slowest possible canter without breaking, and all horses leading with the same leg, was looked on as

the best, and since long rapid movements and the charge were the worst possible preparation for the purpose, they were seldom, if ever, practised. "It tended to get the horses out of hand," it was said, and I have heard the same remark in certain of our own cavalry regiments, not more than 15 years ago.

As a further consequence of this state of things, the stable management adapted itself to the same end. Fat horses, not condition, being the criterion of efficiency, the stables were kept over-heated, ill-ventilated, and the corn administered without reference to the work done. The latter has happened nearer home within my knowledge, and the result was the same in both cases, viz., that the art of deriving the best possible value out of the corn ration in relation to the work to be done became practically a lost one.

Those who would form an idea of the contrast between the Prussian cavalry about the middle of the century and at the present time should compare von Wrangel's requirements, given in Kaehler's "Geschichte der Preussischen Reiterei," which were considered far in excess of possibilities in the army at that time, and those laid down in Prince Hohenlohe's "Letters on Cavalry," about 1884, which, high as they then appeared, have since been considerably surpassed.

1847 marks about the lowest level they ever touched. The Schleswig-Holstein War and the Baden Rebellion, which broke out the following year, infused fresh life into the arm, and it was now that the advantages of the squadron system began to show themselves. Amongst the young officers coming forward were von Schmidt, von Rosenberg, von Krossigk, and, indeed, all the men who of late years have made the arm what it is.

Being men thoroughly imbued with the true cavalry spirit, they individually revolted against the cult of the fat horse and circus rider, and claiming, as far as possible, the free hand their commissions accorded them, they independently set to work to elaborate a system better suited to their practical requirements.

It was in the small garrisons, far from the madding crowd (of "brass hats" understood), that the foundations of the new structure were laid. The views of the reformers slowly spread through their regiments, and the more independent amongst their comrades instinctively copied their practice. But the progress was exceedingly slow, and but little had been gained when the Austrian War of 1866 broke out. Into the tactical shortcomings of the arm during this campaign I have no space to go—they are sufficiently apparent to those who read the official history between the lines—what saved them was the work of individual officers and squadrons who during the long years of peace had been striving to make their commands more fit for war, in spite of inspection ideals. The war, however, had the good result of attracting universal attention to the state of the arm, and initiating a better system.

This was marked by the appointment of Prince Frederick Charles as Inspector-General of Cavalry immediately on its termination. This at once changed the whole spirit of the inspections, and now came the opportunity the reformers had longed for.

During the next three years the progress was rapid, but the time was too short for really great and thorough changes.

Though after 1866 the majority of the officers had become imbued with the new spirit, and recognised the necessity for change in the existing method of training both man and horse, there were probably not 5 per cent. who knew by experience and with conviction what the new method ought to be; and since this experience and the precision with which the routine of training must work to secure good results cannot possibly be acquired under several years, the actual performances of 1870 fell far short of the ideal to which the spirit pointed.

It is not my intention or desire to write disparagingly of what the Prussians did in this war, and I willingly concede that the results were a surprise to the world, and relatively of a very high order; but I want to bring home to my readers that it is no good possessing, even in its highest form, the dash and daring of the true cavalry spirit unless one has also the perseverance and endurance to train one's command, whatever it may be, to serve as an efficient tool in one's hands.

It is an admirable characteristic in a young subaltern to volunteer for a 100 mile reconnaissance, and a grand resolution for a great leader to hurl 60 squadrons against the foe; but if the subaltern's horses and men have never been trained to cover a third of the distance, or the General's squadrons have never learnt to manœuvre together, the dashing spirit will only meet with disaster, and the resolution which in one case makes a man's name for life in the other establishes only his reputation for unbounded folly.

The mistake very generally made in other countries outside of Germany was the assumption that everything that happened in 1870 was the result of design, carefully prepared and thought out beforehand, that, in short, all was for the best in the best of worlds possible, and that the cavalry acted in each instance as it did because it was cavalry, *i.e.*, a body of uniform excellence led by commanders of uniform skill, and not that any particular action was strictly conditioned at the moment, because a particular leader happened to be at the spot with a particular body of men whom, for the most part, he had trained himself.

But the Germans discriminated, and only took their best results as a criterion of merit. Their cavalry leaders were not in the least inflated by the relatively high average of their achievements, but admitted frankly that, though with the material as it was they had done well, they had done nothing to what might have been achieved had a higher standard of training and greater uniformity placed better weapons at the disposal of the excellent spirit undoubtedly displayed by all ranks.

Scarcely was the war over when they were at work again, and already by 1876 their cavalry manœuvres showed a great improvement. This was the time of von Schmidt's greatest activity. His inspections, even of a single squadron, lasted from morning till night. He would dismount man after man, and get up and show him how the thing ought to be done himself, and this not because he was not perfectly aware of the evils of interference with subordinates, but

because the actual method of training had as yet not reached more than, say, 10 to 15 per cent. of the squadrons, and both officers and men still required to be shown by example what was actually demanded of them. It was a death struggle between the old and the new schools, between the routine traditions handed down from von Elpons and his followers, and the practical methods of von Rosenberg, von Schmidt, and their scholars.

In spite, however, of almost superhuman efforts—von Schmidt fairly killed himself by over-work—progress was only slow. How slow, the following quotation from a work published in 1885 affords an indication :—

"Our riding education keeps our horses during the whole of the winter, viz., from October to April, in the riding school. Then follow the squadron training and regimental drills, also on level parade grounds. Only during the short period of detachment exercises and manœuvres, which last only four weeks, is it necessary for cavalry to ride straight over whatever comes first. Is it possible that the soldier will feel full confidence that his horse will carry him safely as long as he sits still and does not worry his mouth? Is it to be expected that he can keep his eyes fixed on his squadron leader and the enemy? Is it not much more likely that he will be anxiously looking down at every stone and cart rut on the ground, pulling at his horse's head, and thereby destroying the order of the formation? But how can a leader who has been brought up in this groove feel confidence in the ability of his men to follow him, when he knows that every potato field, every ridge and furrow, loosens their order?"

This extract is taken from Prince Hohenlohe's "Conversations about Cavalry," a book that grew up out of his "Letters on Cavalry" previously referred to. In the preface to the former he gives the origin of the book, which was briefly stated as follows :—

His letters, though warmly received by the army in general, met with considerable dissent in the cavalry in particular; not because he praised them too little, but because he overrated their performances, making them out, they felt, so much better than they really were, that it was feared its tendency would be to relax their efforts towards perfection, not to encourage them.

An old friend of his, who throughout the book is designated as von S., and who my friends in Germany have always told me was none other than the Crown Prince, now King, of Saxony, came to him as spokesman of the arm, and submitted their views on the subject, from which resulted a series of conversations, which are embodied in the book, and of which, in passing, I would only say that it embodies almost every essential of the principles and methods of training horses and men in a manner and with a clearness hitherto unequalled in military literature, and of all the many books which ought to, but never, have been translated into English of late years, it occupies one of the first, if not the very first, place in order of merit.[1]

The above quotation is an expression of opinion by von S. (founded

[1] A translation is now appearing in the "Journal of the United States Cavalry Association."

on experience) on certain passages of the "Letters" published about 1883.

My own experience of the German cavalry, not Prussian even, in the same year certainly did not convey quite so pessimistic an impression to my own mind. Again and again I saw whole divisions sweep over cart ruts, field drains, and other minor obstacles without any of the anxious craning he refers to, and though I certainly did see a regiment of hussars charge infantry across 600 yards of open in column, when there was no conceivable necessity for their doing so, their performances seemed to me, fresh from studying our own cavalry brigades at Aldershot, under the late Colonel Percy Barrow's guidance, as just about all that could be demanded of such numbers and far more than could reasonably be expected from such short-service soldiers.

I have therefore always discounted von S.'s opinion, accepting it not as a statement as to how things actually were at the date of publication, but of what they had been some few years beforehand, but at any rate a good deal subsequent to the war.

Generalizing from numerous conversations with German cavalry officers during the past three years, I am inclined to believe that the great move in advance did not commence in earnest till about 1884, at which time the bulk of the squadron leaders were men trained under the new system, and with the advantage of early war experience; but from this date it went forward with ever increasing velocity, as each old colonel, bred under the old *régime*, was removed and his place taken by a younger man.

The process of eliminating old traditional errors, more particularly in equitation continues, and although there is a tendency still in certain districts to coddle both men and horses during the winter months, it is rapidly disappearing, and I myself saw last winter the cavalry in the Brandenburg garrison go out for field movements with the thermometer some 8° below zero; so that in the main von S.'s criticism can no longer be held to apply.

As an instance, by no means the only one I could cite, let me give a case I saw in the manœuvres of 1891 in the Cassel-Erfurt district. The first encounter took place between the cavalries of the two armies in the vicinity of Mühlhausen on the 17th September. On this day the cavalry division of the XIth Corps issued from the mountainous district they had been marching through from Cassel and came in contact with the cavalry of the IVth Corps advancing from Erfurt. Close to the village of Seebach I came on a brigade of three regiments of the latter force. Just as I reached it the brigade moved off westward in a rendezvous formation, *i.e.*, with the three regiments abreast in line of squadron columns at close interval. From where I stood the ground fell away to the north and west in gentle undulations; there were no fences or hedges, but in the trough of each undulation lay generally a running stream a couple of feet wide, flowing between boggy banks, a few pollard willows indicating its course. Here and there slight outcrops of rock and some patches of low scrub offered further impediments to progress.

Northward lay the town of Mühlhausen, out of which a *chaussée*, bordered with the usual avenue of poplars, ran almost due west along the crest of a long gentle spur that came down from the distant mountains, and amongst the trees on the *chaussée* I could detect, by their white cap covers, the enemy's patrols.

The brigade moved off down the slope and across the first hollow at a steady trot, crossing the stream in the bottom without losing for a second its sharply-defined rectangular outline, every horse quiet and steady in its place, not a sign of that useless expenditure of force indicated by plunging restive horses, which the passage of the smallest obstacle usually entails. Then they brought up their left shoulder, and in the distance I saw a second brigade converging on them. Presently they came within supporting distance of one another, and both wheeled up till they fronted northward; their horse artillery battery galloped out on the inner flank, and its first round was answered by the enemy's guns in position along the *chaussée*.

The two brigades had meanwhile continued their advance towards the enemy at the same uniform pace, their outline as sharply defined as the edges of the squares on a chess board; but on hearing the first round they opened out to line of squadron columns at full interval, at the same time forming two lines in échelon, two-thirds of the whole strength in first line.

Descending into the hollow, they were, for a moment, hidden from the defenders' artillery, but beyond that they would be in the full sweep of his shrapnel. They crossed the brook in the bottom with perfect steadiness, and then, taking advantage of the cover the rise afforded them, sounded "Line to the front," and, the moment this was completed, "Gallop," and swept over the brow of the hill in a well closed-up line. For a moment, as they descended into the last hollow between them and the enemy, I lost sight of them; but presently they reappeared, dashing up the further slope at the fullest extended speed of their horses, but I noticed that the rear rank was no longer quite as well closed up as usual. The inner flank was almost on the road, it seemed to me, when suddenly the two nearest squadrons went "troops left," and the head of the column thus formed changed direction to the right, the rest of the first line, followed at a couple of hundred yards by the second one, dashed over the road ditches, and the whole disappeared behind the screen formed by the trees and into the valley beyond.

The countercharge, which was actually attempted, was masked from my view by the advancing lines, but less than a minute after the troops crossed the road I saw two regiments of white caps and their battery tearing up the slope beyond above the screen of the trees, and closely followed by three regiments of our own side. The Umpire Staff then appeared and put a stop to the proceedings, and I had time to examine the ground.

In the hollow in front of the *chaussée* I came on the cause of the unsteadiness in the rear rank referred to above. This was a broad drainage channel, about 12 ft. wide at top and 5 ft. deep, cut along the

bottom, with side slopes of 1 by 1, a sufficiently serious obstacle. The horses, by the marks of their hoofs, had mostly skated down the first 3 ft., and then jumped the remainder clear. Further on I found the reason for the break into column above alluded to. The road was here scarped out of the side of the hill, and there was a drop of about 13 ft. into it. They had seen it only just in time, and though going at speed were yet so perfectly in hand that they were able to wheel up sharp, and the tracks of the outermost horses were not more than a few feet from the edge. But down in the hollow beyond a still greater surprise awaited me, for here ran a stream of water 6 ft. broad, in a trench 40 ft. wide from cutting line to cutting line, and at least 12 ft. deep; a big "in and out" with running water where one would have wanted to take off. It would have scattered any ordinary hunting field, but a battery and five regiments in all had swept over it, without a single man down, at the fullest extended speed of their horses.

I have since measured the distances carefully, and checked and counter-checked the above account in conversations with several officers who took part in the event, notably the officer commanding the battery, and therefore can vouch for the accuracy of my statement, on which in England, at the time I first made it, considerable doubt was cast. It is only necessary here to add, in continuation of my argument, that none of the five regiments were among the half dozen reputed crack Prussian regiments, but were ordinary line cavalry, two of them Hessians, and that the distance from where the trot first sounded to where they halted was as nearly as possible 10,000 yds., the last 1,500 of which were covered in the charge and pursuit.

Since then I have witnessed many charges, one even in which 60 squadrons took part under one leader, and though in none was the ground quite as difficult as in the above instance, still it was far from being the level parade ground style to which von S., in his depreciatory remarks quoted above, refers.

Individual regiments gave proof of skill but little, if at all, inferior to this even in 1870; but the point to notice is that now all can be relied on to accomplish what then only crack squadrons could undertake.

One point on which all German cavalry officers are agreed is the enormous improvement in the horses during the last 20 years, but it is difficult to decide how much of this is due to better remounts supplied by the Government studs, and how much can be fairly attributed to more thorough stable management and a higher standard of condition. This much, however, is tolerably clear, that had the old cult of the "fat" horse still persisted, no results achieved in the breeding establishments would have been of any avail. The key-stone of German cavalry efficiency is undoubtedly the now universal appreciation of what is really signified by "condition," for without condition the drill necessary to obtain their perfect precision of manœuvre would only end in the breakdown of the material.

THE EFFECT OF THE LEE-METFORD BULLET ON THE BONES OF HORSES.

By Veterinary-Captain F. Smith, Army Veterinary Department.

In December, 1885, the first experiments were made in this country to determine the effect of small-bore bullets on the bodies of animals. It was believed that the narrow projectile would not stop a horse in a cavalry charge, and it became a matter of considerable importance to ascertain exactly the destruction which the bullet was capable of inflicting.

The results of these experiments were astonishing; the damage done to bones and joints was such as was never anticipated, and it was seen that, so far as the diameter of the bullet was concerned, it might safely be calculated to inflict the maximum of damage on vital parts of the body.

Bullets of various compositions were then tried, giving rise to experiments which extended over some few years; all of them, however, demonstrated the intense destruction which a small bullet was capable of inflicting on the dense tissues of the body, such as bones and joints.

The outcome of these experiments was the adoption of the Lee-Metford bullet as we now know it, and when the projectile was finally determined on, its destructive influence was made public owing to a paper which appeared in this Journal,[1] by Surgeon-Captain Marsh, who from two simple flesh-wounds of the human body drew conclusions which were quite contrary to the results obtained by direct experimental enquiry on the lower animals. Surgeon-Captain Marsh regarded the bullet as a "humane" one, and this view was also adopted by the "British Medical Journal."[2]

These facts are merely of historical interest; the difference of opinion held by the medical and veterinary professions has already been pointed out in a service periodical, and recent injuries produced on the human subject have caused the "British Medical Journal"[3] to wonder how the word "humane" could ever have been applied to the Lee-Metford bullet!

The extreme views held by the leading organ of the medical profession were not without its advantages; up to this time the range at which experiments had been conducted with the Lee-Metford bullet was, with one or two exceptions, only a short one, and the question was very properly raised that conclusions which were based entirely on short-range injuries could not be satisfactory. It was determined,

[1] "Magazine Rifles in War." November, 1891.
[2] 16th January, 1892.
[3] 14th October, 1893.

therefore, to carry out experiments from 50 yds. up to 1,000 yds.; and in this enquiry I received the hearty co-operation and assistance of Major Eyre Crabbe, District Inspector of Musketry, Aldershot, who offered every facility for experiments of a prolonged and tedious nature, and, moreover, undertook to do all the firing. I take this opportunity of thanking him for his help, without which this question could not well have been solved.

It may be interesting to learn the various methods of experiment which were devised, as such may be useful in the future.

In the early stages of the enquiry, the subject to be experimented upon was, after destruction, slung on a horizontal bar in an attitude resembling, as near as possible, that of the living animal, and the spot to be fired at was marked with whitewash or a piece of paper; to protect the surrounding parts from injury, a plate was suspended over the region shot at, with an opening of about 4 in. in diameter in its centre; if the bullet entered the hole in the plate we could make nearly certain that the exact part was struck. In this method the bullets could not be recovered, and, as it was important to learn what changes they had undergone in passing through dense structures, a large box of sawdust was arranged behind the part fired at, and the bullet recovered after each round. A simpler method would have been a water-tank with rubber sides, such as, I believe, is employed for a purpose of this kind.

A very curious point, of considerable medico-legal interest, was discovered during these experiments. It was observed, when the dissections were made, that the appearance of the damage inflicted closely resembled what would have occurred in the living body, such as hæmorrhage in the track of the bullet, &c., and it was found to be impossible to say whether any bullet fired into the body within half an hour after death, had not been fired during the life of the animal!

When we were satisfied with the penetrative power of the bullet, the limbs in the later experiments were removed and suspended opposite to the box of sawdust, and this was found to greatly facilitate the rapidity of the work.

Horses, ponies, donkeys, and sheep were in this way experimented upon, but, with one or two exceptions, the range was limited to 50 yds., owing to the difficulty of hitting such a small target as a bone or joint.

When, after the adoption of the Lee-Metford bullet, it was determined to see the effects at long ranges, the following method of enquiry was employed, which proved to be both simple and efficacious:—

The bones to be fired at were fixed on to the canvas of an ordinary target by securing them with string; the whole target was in this way covered with bones of different sizes and varying degrees of resistance; if the target were hit, a bone generally suffered, and in this way grazes, direct hits of shaft and extremities, &c., were readily obtained. The bones when hit were removed and others substituted.

Photo. No. 1.

Photo. No. 2.

Photo. No. 6.

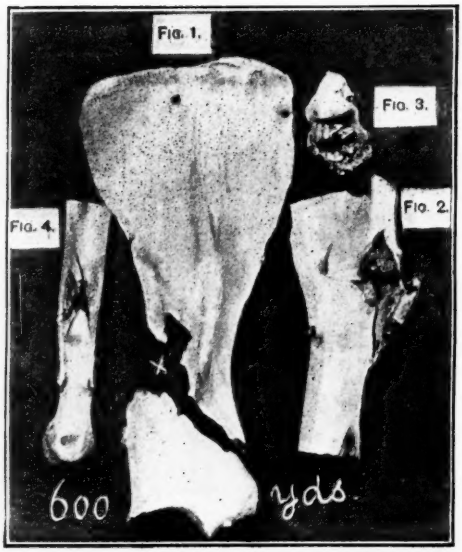


Photo. No. 6A.

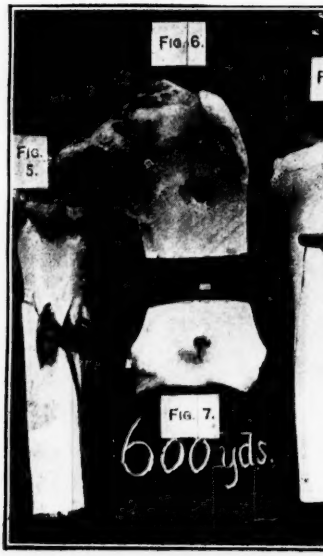


Photo. No. 3.

Photo. No. 4.

Photo. No. 7.

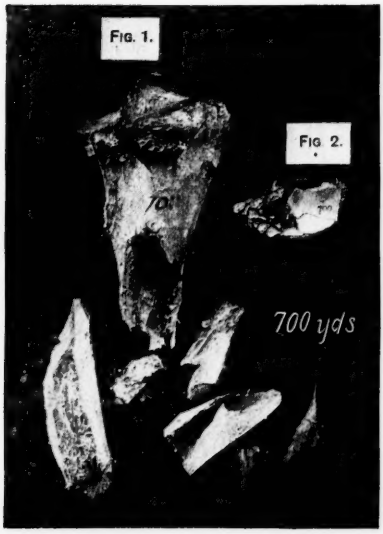


Photo. No. 8.

Photo. No. 4.

Photo

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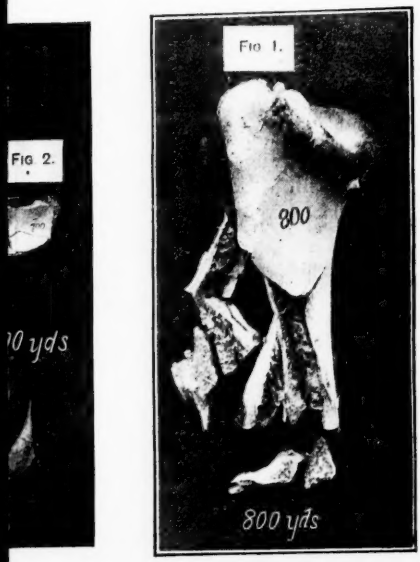
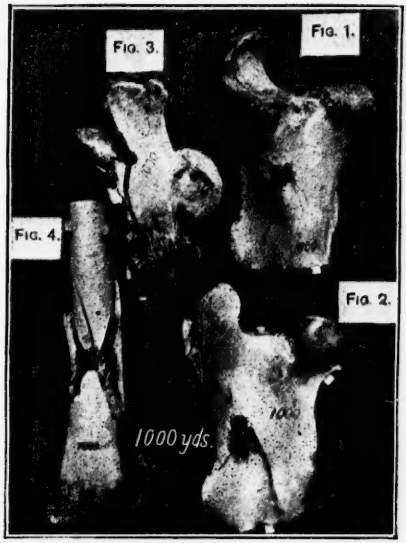


Photo.

Photo. No. 5.

Photo. No. 9.

Photo. No. 10.



In this way we avoided the error likely to arise from the employment of reduced charges. All the injuries to be described in this communication were inflicted at the actual range, and in this they occupy a unique position; for, I believe, in all long-range observations made on the Continent, the distance is represented by diminished charges, and therefore the accuracy of the results may be seriously affected.

To understand the character of the injuries recorded in the following pages, it is necessary to remember that bones are of varying degrees of resistance, depending upon the density of the tissue which enters into their formation; the shaft of a bone is often as dense as ivory, whilst the expanded extremities are composed of a rarefied bony tissue, which offers comparatively little resistance to the passage of a bullet. This difference in the resisting power of a bone has been very well marked in our experiments; for, outside a zone which it is permissible to speak of as the zone of explosive effect (viz., from 50 yds. up to 200 yds.), the injuries produced partook of a special character, more or less severe, depending on the density of the bone, whilst within that zone this rule was by no means so well observed, and destruction was more general and much more severe.

From this it can be seen that all the earlier experiments were carried out within the zone of explosive effect, and that no distinction was demonstrated to exist between the damage inflicted on the dense and on the rarefied portion of bones, such as was later discovered to occur at longer ranges.

Experiments at 50 yds. (Plate 2, Photograph 1.)

Expt. 1.—The thigh bone was hit in the middle of its shaft; it fell to the ground; nothing but the extremities of the bone remained; the shaft was represented by fragments which flew out at right angles to the target[1] for a distance of 6 ft.; a large splash of blood and marrow, 8 in. in diameter, remained on the target as evidence of the shock.

Expt. 2.—The shank bone was hit about the centre of its shaft, in a region where the resistance is the greatest; a chasm, 2 in. by 4 in., resulted, which was filled with bone dust; the bone was in two pieces, and in the track of the bullet were hundreds of fragments (see Photo. 1, Fig. 1), which clearly shows the shell-like effect.

A rioter, hit on the shin in the recent Bombay riots, is described in the "Pioneer" as having lost his leg from the knee to the ankle; the injury must have been similar to those just described.

Expt. 3.—The forearm was hit just below the elbow joint; the bone was shattered, fell apart, and severe fissuring occurred down the shaft. The injury is shown in Photo. 1, Fig. 2, the head being restored to the shaft for the purpose of being photographed.

Expt. 4.—The arm bone was grazed just below the head; a deep groove marked the passage of the bullet, and the shock fissured the shaft, though the bone was not broken.

[1] The bones in this 50-yds. experiment were fixed to a plank; at all other ranges the canvas target was employed.

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Expt. 5.—The long pastern bone was just grazed; the part being exceedingly dense, a complete transverse fracture occurred as the result of the shock.

We see here the influence of density well exemplified; in Expt. 4 the rarefied end of the bone was grazed and the shaft was only fissured; in Expt. 5 a most trifling graze to a dense bone resulted in a transverse fracture.

An almost parallel case to Expt. 5 occurred to a man in the North Camp at Aldershot, who was shot through the thigh at a few paces' distance; the bullet grazed the thigh bone very slightly, and the bone broke transversely; the man died from hæmorrhage, the vessels having been cut across. A miner, shot in the recent colliery riots, suffered from a very similar injury; the arm bone appears to have been only grazed, but the part suffered a transverse fracture; the distance at which he was hit was 40 yds. or 50 yds.

Expt. 6.—The blade bone was hit at its thinnest part where the resistance is practically *nil;* a clean hole resulted, the exit being larger than the entrance, but there was no fissuring or destruction owing to the absence of resistance (see Photo. 6, Fig. 1); the right-hand circular wound at the top of the bone was produced at 50 yds.

Expt. 7.—The inner aspect of the hock joint was hit, and, owing to the extreme resistance offered, the part was reduced to a powder, the largest bone of the joint being left in fragments. The bullet passed completely through.

Expt. 8.—The lower thigh bone was grazed; a piece of bone 4 in. in length was turned completely back and held there by a shred of tissue; as a result of the shock the shaft of the bone was fissured.

Very little analysis of these injuries is required; direct hits of bone result in pulverizing, smashing, and fissuring, the amount of these being for all practical purposes independent of the resistance of the tissues. Grazes of the shaft of the bone may result in transverse fracture due to shock, or, where the resistance is less, the part is fissured.

The thin part of the blade bone, as it offers no resistance, has simply a hole the size of the bullet punched in it.

Experiment at 100 *yds.* (Photograph 2.)

Expt. 1. The lower thigh bone was struck about the middle of its shaft; the part was completely fractured and shattered; there was great loss of substance, and fissures extended up and down the shaft of the bone. (See Photo. 2, Fig. 1.)

Experiments at 200 *yds.* (Photograph 2.)

Expt. 1.—A small semi-rarefied bone, situated at the back of the fetlock, was struck; it was pulverized in the track of the bullet, and the remainder reduced to fragments. (See Photo. 2, Fig 3.) The companion bone adherent to it was intact.

Expt. 2.—The bone of the forearm was hit just above the knee joint,

viz., in the rarefied extremity; the inner half of the head of the bone was detached; the channel caused by the bullet was filled with bone dust and fragments. The fracture extended into the knee joint; the wound of exit was considerable, owing to portions of bone having been carried through. (See Photo. 2, Fig. 2, which also shows the fissuring.)

Expt. 3.—The shank bone was hit at its lower third, where the part still retains considerable resistance; the bullet entered in that region which is to the left edge of the figure, and passed out at the back. The explosive effect, so well seen in Photo. 2, Fig. 4, was the result of resistance; the bone is completely fractured transversely and obliquely, and fissures in the shaft may also be seen. The track of the bullet was filled with bone dust.

Experiments at 300 *yds.* (Photograph 3.)

Expt. 1.—The arm bone was hit in the middle of its shaft, which was completely fractured with considerable loss of substance and fissuring of the part. (See Photo. 3, Fig 1.) The larger fragments of bone which were detached were not introduced into this photograph.

Expt. 2.—The upper thigh bone was hit immediately under the head of the hip joint, where the bone is rarefied; a hole large enough to admit the thumb was made; the track contained fragments of bone, and fissuring and detachment may be seen around the exit opening. The injured region is seen in Photo. 3, Fig. 2; this is the nearest approach to a clean hole yet met with in any bone of substance.

Expt. 3.—A bullet passed through the back of the hock, grazing the small bones of the joint, which were in consequence pulverized along the track of the wound.

Remarks.—We may safely say that Experiment 2 is commencing to demonstrate the influence of distance on injuries to the extremities of bones, viz., a tendency to punch a hole rather than smash. Shattering still takes place when the dense shaft is hit.

Experiments at 400 *yds.* (Photograph 4.)

Expt. 1.—The lower thigh bone was hit at the middle of the shaft, a long oblique fracture resulted, with considerable loss of substance; a piece of the shaft, 3 in. by 2 in., was carried away for some distance. Well-marked fissuring of the shaft occurred. (See Photo. 4, Fig. 1.)

Expt. 2.—The elbow bone was grazed; a piece 4 in. in length was broken off and detached. (See Photo. 4, Fig. 2.)

Experiments at 500 *yds.* (Photograph 5.)

Expt. 1.—The shank bone was hit in its upper extremity at a part where it is still very dense; an irregular cavity, 2 in. by 1 in., was left to mark the track of the bullet, the wound being filled with bone dust; from the cavity extended fissures up, down, and across the shaft;

the large one seen in Photo. 5, Fig. 2, running upwards and to the left, completely detached the head of the bone. The extensive fissuring and loss of substance are well shown in the figure.

Expt. 2.—The bone forming the point of the hock was hit and the part was shattered. Photo. 5, Fig. 1, is not a very successful photograph, but the injured part was knocked out of all recognition, and was simply a mass of bone dust and fragments.

Experiments at 600 *yds.* (Photographs 6 and 6A).

Expt. 1.—The shank bone was hit about the middle of the shaft; a cavity 1 in. by 1½ in. resulted, the track of the bullet being filled with bone dust; the bone was broken completely across, and deep fractures and extensive fissuring extended up and down the shaft. Photo. 6, Fig. 4, shows a side view of this injury, whilst Photo. 6A, Fig. 5, gives a front view.

Expt. 2.—The neck of the blade bone was struck at a part where there is a little resistance; the bullet entered just above the × on the photograph, carried away some of the substance of the bone, and broke the neck across as the result of the shock. (See Photo. 6, Fig. 1.)

Expt. 3.—One of the small bones of the knee joint was struck; the bullet passed through it, and left nothing but bone dust and fragments to mark its track. (See Photo. 6, Fig. 3.) The other bones forming the part are uninjured, and are seen just above the pulverized one.

Expt. 4.—The bullet passed through the outer edge of the upper thigh bone, above the shaft where the tissue is rarefied. The opening of exit is seen in Photo. 6, Fig. 2; the severe fissuring of the body of the bone—from what was little more than a graze—comes out very clearly.

Expt. 5.—The bullet entered the lower extremity of the forearm bone just above the knee joint; a fairly clean hole resulted, with a circular depression around the entrance, and a fissure leading up the shaft; no damage was done to the knee joint, though a small fissure ran towards it. (See Photo. 6A, Fig. 7.)

This is a most important specimen from a surgical point of view; the small hole resulted from the comparatively slight resistance and the reduced initial velocity; a larger bullet would certainly have split the bone into the knee joint. The effect of resistance can be seen by the fissure running up the shaft where the bone is dense; this fissure resulted from shock. The influence of the reduced initial velocity is seen by comparing the specimen with that in Photo. 2, Fig. 2, a corresponding bone, hit within 1 in. of the same place, but from a distance of 200 yds.

Expt. 6.—The lower thigh bone was hit in its upper extremity close to the stifle joint, and where the rarefied tissue predominates; a clean hole with a depressed area around the point of entrance resulted; no fissuring of the shaft occurred. (Photo. 6A, Fig. 6.)

Expt. 7.—The forearm bone was hit in its upper part, the bullet

grazing it in passing from left to right of the specimen seen in Photo. 6A, Fig. 8. The shape of the bullet distinctly remains in the compact substance of the bone; having entered the shaft obliquely, it carried out a fragment about 3 in. in length, severely fissured the shaft in a downward direction, and also upwards into the elbow joint.

Experiments at 700 *yds.* (Photograph 7.)

Expt. 1.—The lower thigh bone was hit about the middle of its shaft; the bone fell apart with great loss of substance, the shaft being represented by six large fragments and dozens of smaller ones. (See Photo. 7, Fig. 1.)

The rioter hit in Bombay, whose leg is said to have disappeared from knee to ankle, though probably shot at less than 100 yards, could not have had a more complete injury than is represented by this specimen; the fragments which are carried out with the bullet convert the wound of exit into an opening which will admit the hand, and lacerate and pulp the surrounding muscle substance.

Expt. 2.—One of the dense bones of the pastern was grazed on that surface which forms a joint with the bone above it; the track of the bullet was reduced to powder and small fragments of bone, whilst fissures extended across the remaining joint surface. (See Photo. 7, Fig. 2.) The damage here done was due to the density of the bone.

Experiment at 800 *yds.* (Photograph 8.)

Expt. 1.—The shaft of the arm bone was hit and demolished; considerable loss of substance resulted; the fracture extended down into the elbow joint, through two or three distinct lines, and long fissures also ran up the shaft of the bone. (See Photo. 8, Fig. 1.)

Experiments at 900 *yds.* (Photograph 9.)

Expt. 1.—The bullet hit the shaft of the shank bone and the part dropped in halves, severely fissured up and down the shaft. (See Photo. 9, Fig. 1.) A large piece of bone is missing from the left-hand side of this specimen and could never be found; I believe it was carried into the butt.

Expt. 2.—The lower thigh bone was hit just above the hock joint; a fairly clean hole resulted, with fissures running towards the joint and up the shaft. (See Photo. 9, Fig. 2.) Had the wound been inflicted a little higher up, where the bone is dense, the part would have been completely destroyed.

Expt. 3.—The arm bone was grazed just under the shoulder joint; a deep groove wider than the bullet resulted, which was filled with bone dust, whilst fissures due to shock extended down the shaft. (See Photo. 9, Fig. 3.)

Expt. 4.—The blade bone was hit where it is very thin; a clean hole resulted (see Photo. 6, Fig. 1); the left-hand top injury is the one inflicted at 900 yds., whilst the hole on the right hand was inflicted at 50 yds.

Experiments at 1,000 *yds.* (Photograph 10.)

Expt. 1.—The bone forming the point of the hock was struck near its posterior edge; the bullet passed through, breaking the part outwards for 4 in. in length. (Photo. 10, Fig. 3.) Had the bone possessed somewhat less resistance, a clean hole would have resulted; the entrance of the bullet is well seen.

Expt. 2.—The upper thigh bone was hit in its superior extremity at a part where the resistance is comparatively small; the bullet passed through, making a fairly clean hole, the wound of entrance (Photo. 10, Fig. 1) being very little smaller than that of exit (Photo. 10, Fig. 2); fissuring of the bone both up and down the shaft occurred, but not to any important extent.

Expt. 3.—The shank was hit in the middle of the shaft at an extremely dense region of the bone; the part was dreadfully shattered and broken completely in halves through long fractures which extended up and down the bone for several inches. The bullet did not pass completely through, but broke up—a portion of the lead and the stripped nickel cover remaining in the wound. (Photo. 10, Fig. 4.)

Expt. 4.—The lower extremity of the arm bone was hit just above the elbow joint; the bullet made a fairly clean hole but severely fissured the bone into the joint. Through an oversight there is no photograph of this injury.

Expt. 5.—The inferior extremity of the upper thigh bone was grazed just above the stifle joint; the track of the bullet was converted into bone dust, but there was no fissuring of the surrounding parts. The injury was very like that in Photo. 9, Fig. 3, but without the fissuring.

Conclusions.

Circumstances prevented the carrying on of experiments at any greater range than 1,000 yds.; it would have been most interesting to have determined the damage produced up to 1,500 yds., but the range was not obtainable.

We are able, however, to form a fairly correct opinion as to the injury this Lee-Metford bullet is capable of inflicting from 50 yds. up to 1,000 yds., and the experiments resolve themselves into two groups, viz., those from 50 yds. to 200 yds., and from 300 yds. to 1,000 yds.

The first group comprises those injuries which in appearance resemble those of an explosive character. If we except the blade bone (which in the 50-yds. experiment was struck in a part less than $\frac{1}{8}$ in. thick), all the direct injuries are of the most severe kind. At a short range like this the difference in the resistance offered by the solid shaft or the rarefied extremity makes very little difference to the amount of damage done. Of the scores of injuries I have dissected, inflicted at 50 yds. with the ·303 bullet, I only saw one which simply perforated a bone;[1] the part is always pounded, fragments

[1] The bullet which inflicted this injury was a steel-covered bullet by Hebler; it struck the rarefied extremity of the thigh bone and made a complete hole.

are frequently carried out through the wound of exit, which is commonly converted into a gaping orifice, the muscles are pulped, and in fact, the limb mangled and damaged beyond repair.

There is no reason to believe that the results on the human being at 50 yds. would be any less disastrous, and I am convinced of the stopping effect of this bullet; even a savage would find some difficulty in making headway with a shank bone in the condition of Photo. 1, Fig. 1.

If this bullet simply passes through muscle it practically creates no damage of any importance, and from its small size the blood-vessels and nerves of the limb stand a better chance of escape than they did with the old Snider and Martini. If a savage were hit in the fleshy part of the thigh with a ·303 I should not expect that it would have any stopping effect on him, unless the main artery of the limb were torn open, and even in this condition he would travel some little distance before falling; but let that man be hit on any of the long bones of the leg and his progress is at an end. On the other hand, if he were hit in the upper extremity (and I am now referring to a savage) I see nothing to stop him in a smashed shoulder or a pulped elbow, because, like the horse, he apparently does not suffer from shock, and he still has the use of a pair of legs and an upper extremity; or, if he were shot through the chest with a bullet no larger than a pencil, it goes clean through him, touches, we will say, nothing of vital importance, and he remains a dangerous man for some time to come.

In savage rushes the lower extremities should be the chief target aimed at; no man can travel with one of the bones of his leg in fragments. In dealing with a civilized foe the shock of a simple flesh wound would probably be enough for most men, and afford them a good excuse for leaving the fighting line, and certainly non-fatal wounds of the chest would cause a gap in the ranks. The question of shock is here infinitely more urgent than the wound.

Recently in Dahomey we have had evidence not only of the destructive effect of narrow bullets, but their capacity for stopping rushes. The correspondent of the "Figaro,"[1] in describing the attack on Colonel Dodd's column, says: "The Lebel rifle accomplished in grand style its work of destruction, converting into a kind of human jelly the howling mass which whirled on our front. In a few minutes the ground was cleared up to the edge of the bush. . . . The Lebel bullets inflict wounds like those made by explosive bullets. It is impossible to convey an idea of their disorganizing effect on the human body. For all of us these effects of the Lebel bullet proved a revelation." The Lebel rifle has a bore of ·315 in., which is somewhat larger than that of the Lee-Metford; the range at which the above action took place was about 50 yds., and the results compare very closely with what we know the Lee-Metford is capable of doing at the same distance.

In considering the nature of the injuries produced between 300 yds.

[1] "Standard," 27th September, 1892.

and 1,000 yds. it is clear that they have a tendency to resolve themselves into (1) comminuted fractures and pulverizing of the resisting parts of bones, and (2) comparatively clean holes of the non-resisting regions such as the extremities; it is evident that a wound near a joint may be much less dangerous than one some distance from it, which is in reality a surgical paradox.

I do not think that any advantage can be derived from comparing my distance experiments with those made on the Continent with reduced charges.

I have failed to discover the humanity of the narrow bullets when used on horses; but I do not disguise from myself that there may be differences in the resisting power of human and equine bones which may prevent laws deduced from experiments on the latter being wholly applied to the former. We do know, however, the effect of small-bore bullets on the bones of the horse, and that was the original object of this enquiry.

FOREIGN SECTION.

THE THREE DAYS' NAVAL ACTION IN THE DARDANELLES, ON THE 17TH, 18TH, AND 19TH JULY, 1657.

(Translated, by permission of Major von Bigge, from the "Marine Rundschau," by Commander H. GARBETT, R.N.)

Preamble.

IN the winter of 1890–91 (writes Major von Bigge), I was despatched by Count von Waldersee, the Chief of the General Staff, at the request of Dr. Schotmüller, the Secretary of the Prussian Royal Historical Institute, to Rome, in order to make search in the Vatican Library, lately opened to students by Pope Leo XIII, for materials for the completion of a History of the Art of War. As the Vatican Library is closed every Thursday, I utilized my spare time in hunting over other large libraries and archives in Rome known to be rich in literary treasures, and in the library of Prince Chigi I found a small manuscript, the writer of which is not known, with the title, "Relazione del Viaggio delle Gallere Ponteficie in Levante l'anno 1657, sotto il commando del loro Generale Balì Giovanni Bichi." (An account of the cruise of the Papal Galleys in the Levant in the year 1657, under the command of their General[1] the Baillie[2] Giovanni Bichi.)

This small pamphlet contains an exceedingly clear and careful description of the naval expedition which the Venetians, assisted by France, the Pope, and the Knights of Malta, undertook, in the year 1657, against the Turks, and especially of the three days' action in the Dardanelles, on the 17th, 18th, and 19th of July of that year, one of the most important ever fought in those waters. The writer was a member of the force, and his manuscript is in the form of a letter to his brother.

What makes the account peculiarly valuable is the number of clever pen and ink sketches, descriptive of the different events, with which the manuscript is illustrated. Unfortunately, as long visits in the Chigi Library are not allowed, and as my time was very limited, I was only able to copy hastily with a pencil the more important

[1] Commanders of fleets in the Middle Ages, and even later, were as often styled General as Admiral.

[2] The title "Bali" was one of the higher ranks among the Knights of Malta, of which Order Bichi was a member. It is now generally written "Baillie."

of these; consequently a good deal of their freshness and individuality is lost, but they are still sufficiently interesting to accompany the translation, which also, I must add, is by no means a literal one, as to translate word for word was impossible, in consequence of the many obsolete words and forms of expression common in the 17th century, but which are not in general use in the present day. I have also had to curtail a good deal, but have endeavoured to the best of my ability to give full expression to the meaning of the writer.

With a view to a better understanding of the events described, I propose to give a short historical retrospect of the struggle for supremacy at sea in the Mediterranean up to that time.

Historical Retrospect.

By the capture of *Constantinople*, in 1453, the Ottoman Empire obtained possession of one of the most important strongholds in the *old world, and from that* time rapidly extended its authority over the greater portion of the countries which bordered the eastern *basin* of the Mediterranean. The Republic of Venice was the only foe which showed itself a match for the *Turkish arms. In the* Middle Ages, but more particularly from the time of the Crusades, the powerful merchant city on *the Adria had acquired* possession of most of the Ægean and Ionian Islands, and of many places on the mainland, and *engrossed almost* entirely the trade with the Levant. Caravans brought the produce of the East to the great marts of Syria and *Asia Minor*, and from there it was conveyed to the West in Venetian ships. This trade, to which the Republic owed its wealth and power, was now by the advance of the Turks, who aimed at the mastery of the sea, more and more curtailed, and even threatened with destruction. From the beginning of the 16th century, we find Venice struggling almost continuously with the Ottoman Empire. At first the advantage lay almost entirely with the Republic, as the Turks were unable to oppose anything to the powerful Venetian fleet, but in the year 1573, the island of Cyprus was captured by them; at the same time the discovery of the new route to the East Indies by the Cape began to divert the trade with the Levant into new channels, with the result that the power and influence of Venice began gradually to decline. Nevertheless, even in the middle of the 17th century, Venice still possessed the most powerful war and merchant navy in the Mediterranean, and showed herself throughout superior to the Turkish forces; but on land she had nothing fit to put in the field against the warlike national forces of Turkey, as she could only carry on war by means of troops obtained from other countries. In the year 1644, a new war, lasting 24 years, broke out between the two rival Powers for the possession of Crete. This island was of the greatest importance to Venice in maintaining her maritime supremacy in the Mediterranean. From here she was in a position to protect the trade routes of her ships with the coasts of Asia Minor, Syria, and Greece, and to quickly move her fleets on

any point as occasion required. When, therefore, war broke out suddenly, Venice once again collected all her forces together, so as to remain the victor in what would probably prove a decisive campaign. She was also fortunate in inducing some of the other Christian States to come to her assistance, chief among whom were the Popes, who looked upon the war with the Unbelievers as a sort of crusade. They not only provided ships, troops, and money, but used their powerful influence with the other Catholic States of Europe to come forward with help. France and Spain every year sent some ships to strengthen the Venetian fleet, while the Knights of Malta, who were then powerful at sea, made the cause of Venice their own. War with the Unbelievers was the great object of their lives, and to that end the great wealth of the Order was principally devoted.

The war between Venice and Turkey was carried on with changing fortune. On land the Turks were mostly victorious; they succeeded in capturing some of the Venetian strongholds in Candia, and in investing the capital of the island. At sea, on the other hand, they were unable to make head against the Venetians, who swept the Archipelago with their fleet, and were above all intent on preventing their enemy conveying reinforcements to Candia, and on checking his progress in that island. To this end they adopted the plan of blockading the Dardanelles, and so hindering the Turkish fleet from sallying out from Constantinople, where the principal Ottoman dockyard was situated; and they succeeded in doing this during the greater portion of the time the war lasted, until the Turks hit upon the idea of embarking their troops from different harbours in Asia Minor and Greece. By this means they regained the upper hand on land, as the Venetian fleet was unable to blockade all these harbours at once.

The naval war was only carried on in the summer months, as the galleys were not sufficiently seaworthy to keep the sea during the winter, since the Mediterranean is then very stormy; and in the autumn the ships had to take refuge in the harbours where they wintered, issuing forth again about the beginning of April.

For the campaign of 1657 great efforts had been made on the Christian side. The Venetian fleet consisted of more than 40 ships of war, in addition to which there were some French vessels. This force was under the command of General Admiral Lazaro Mocenigo,[1] a brave and skilful seaman, in whom all the excellent traits of character to which the Venetians owed their power were embodied in a marked degree, viz., courage, energy, and impetuosity. It is true he went too far in his eagerness for battle, with the result that he often acted rashly.

Upon the chair of St. Peter at this time sat Pope Alexander VII, a member of the Siennese family of Chigi, and a man bent on the aggrandizement of the Papacy, and anxious to take a prominent

[1] "Captain-General" ("Capitano-Generale") was the title of the Venetian Commander-in-Chief of their land and sea forces. Mocenigo personally commanded the fleet as the most important portion of the Venetian array.

part against the Unbelievers. He therefore, in the spring of 1657, caused five large galleys to be fitted out at Civita Vecchia, and placed them under the command of his nephew, Giovanni Bichi, who, like so many of the high Italian and French nobility, was a Knight of Malta, and therefore well skilled in seamanship and naval war. Bichi at the same time assumed the supreme command of the Maltese ships, of which the Order this year sent seven to the help of the Venetians under Admiral Caraffa. As regarded the position of the Papal Admiral to Mocenigo, the view was held in Rome that Bichi, as a nephew of the Pope, which at that time gave him the rank of a Prince of the Blood, could also claim precedence of the Venetian commander. As the authority of Mocenigo, however, was very great, and Bichi was, comparatively speaking, a young man, it was determined to leave the settlement of the question until later. Mocenigo, however, did not show himself willing to hand over the command to the Papal Admiral; so the latter, as will be related, hoisted the Papal Standard, by virtue of which, as representing the supreme head of Christendom, it was incumbent on all the Christian forces to place themselves under his orders.

Although at this time full-rigged or "tall" ships, as they were often called, were in general use among seafaring nations, yet in the Mediterranean galleys and galleasses, which were both mainly driven by oars, formed a considerable portion of the fighting fleets of both Christians and Turks. The galleys (Italian, "galere") were mostly about 160 ft. long, and some 22 ft. beam, with a poop and forecastle, where accommodation was provided for the officers and men, and, in addition, under the forecastle four small guns were mounted. In the waist, which was only covered by an awning, were the banks or benches on which the rowers sat; there were 54 oars, with five or six men to each, 27 on each side; the rowers, mostly slaves or convicts, were fettered to these benches, where they had to live and sleep as they could. Each galley was provided with a formidable iron stem for ramming; there were two masts, each carrying a lateen sail, which, however, were never used except with a fair wind. The galleass (Italian, "galeazza") was a large galley, three-masted, and was a sort of transition ship, between the galley and galleon or full-rigged ship (Italian, "vascello" or "nave"), which was dependent on her sails alone. The galleasses used their sails as well as oars, had high bulwarks, loopholed for musketry, and, in addition, carried a certain number of guns on each side; the deck on which these guns were mounted served as a cover for the crew and oarsmen. The galleasses generally had a crew of 700 men, of whom 130 were sailors, 270 soldiers, and 300 slaves for the oars. The full complement of a large galley was about 400 men, including officers; of these 270 were rowers. The big ships, even of those days, were of considerable size and tonnage; they had great beam compared with their length; their hulls were high out of the water, and they had two, and sometimes three, gun-decks; some of them carried as many as 100 guns; their forecastle and poops, particularly the latter, were very much raised; they had three masts, each with several square sails, as well

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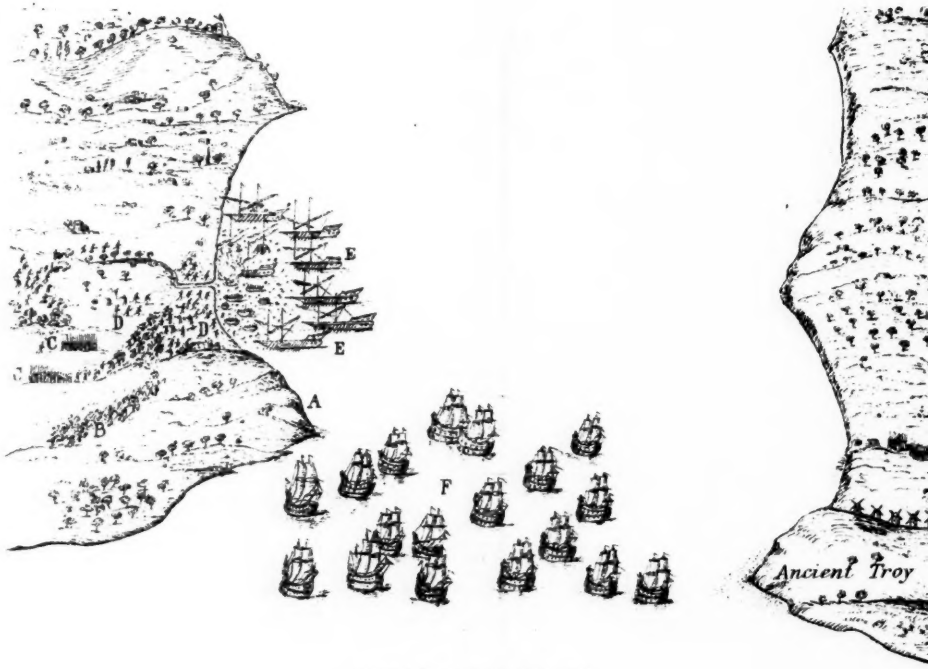
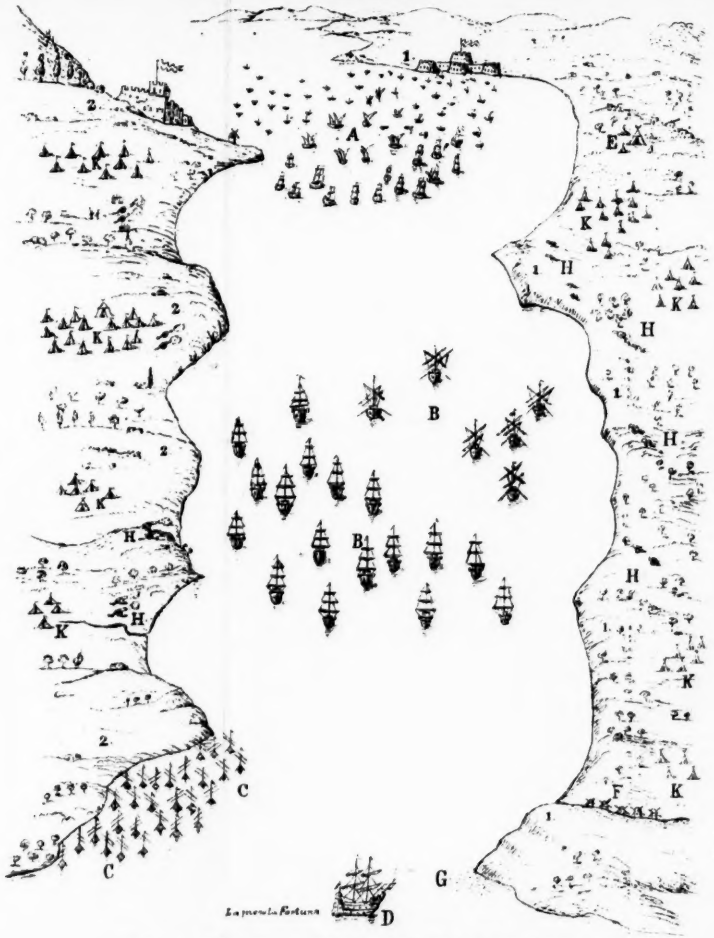


MOUTH OF THE HELLESPONT.

Where the defeat took place, while water was being procured.

A. Cape Chrysias.
B. Turkish Cavalry, hurrying over the hills to attack the Christian infantry.
C. The Christian infantry detailed to defend the men engaged in watering.
D. Christian soldiers in flight.
E. The galleys, bows on to the shore, to protect the watering parties.
F. 18 great ships, which were sent outside the straits by Mocenigo, in order to attack the hostile fleet which was at Rhodes.

SKETCH 2.



17 July. First Day. Disposition of the two fleets.

1. Coast of Anatolia.
2. Coast of Roumelia.
- **A.** How the enemy's fleet came down the straits.
- **B.** How the Christian great ships and galeasses were stationed at the approach of the enemy.
- **C.** Where the Christian galleys retreated when the approach of the enemy was reported.
- **D.** The great ship "La Petite Fortune" commanded by a Frenchman.
- **E.** Tent of the Grand Vizier.
- **F.** Some windmills near the ruined walls of ancient Troy.
- **G.** Shoals off Cape Troy.
- **H.** Places where batteries of guns were observed.
- **K.** Different camps where a hundred-thousand soldiers lay.

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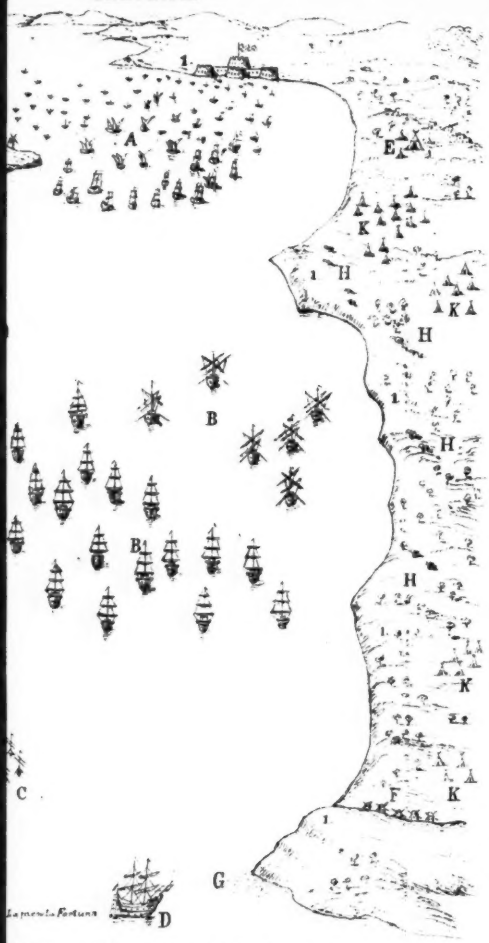
SKETCH 2.



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SKETCH 3.

17 July. First day. The progress of the figh

A. Flying Turkish ships.
B. Christian ships in pursuit.
C. Turkish ships, some aground on the shoal.
D. "La Petite Fortune," the French frigate.
E. Christian galleys behind Cape Chrysias, waiting for the enemy's galle
F. Christian galleys, chasing the enemy on shore.
G. Turkish vessels under shelter in Chrysias Bay.
H. First attack between the Christian galeasses and Turkish maone.
I. Night action between the "Reale" and some other Turkish galleys.
K. The Papal "Capitana," going to the assistance of the "Reale."
L. Enemy's galleys, which belonged to those captured by the "Reale."
M. Enemy's galleys, driven on the Anatolian shore.
N. Armed small vessels, which came out with the galleys.
O. Cape Chrysias.
P. Turkish maone on shore.
Q. Turkish galleys, advancing after the passage of the big ships.
R. 150 sloops manned by soldiers, who proceeding to the help of Tene sight of defeat of their fleet.
S. Promontory of Troy.

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SKETCH 4.

17, 18, and 19 July.

The events on the above-mentioned days.

A. The 12 galleys which were enabled to engage the enemy.
B. Where the rest of the galleys and galeasses remained after the action
C. Stranded Turkish maona on the shoal off Troy.
D. The Turkish Admiral's ship ashore on the shoal.
E. Turkish ship on fire.
F. The Venetian "Reale" on fire.
G. The Papal "Capitana," attempting to remove the enemy's galleys ashore on the Barbieri point.
H. The 12 above-mentioned Christian galleys after the fight.
I. Troy point.
K. Barbieri point.
L. Enemy's galleys, which had taken shelter on the ground under the batteries of point Barbieri.
M. and N. Enemy's galleys, which tried to escape.
O. Turkish maone, sheltered in Chrysias Bay, of which two were burnt by the Turks themselves.
P. Deserted Turkish maona towed off by the galeasse of Magnani.
Q. Cape Chrysias.
R. Stranded Turkish galleys, which were burnt.

as a bowsprit, on which also a fourth small mast was carried. The ships were, however, cumbrous, slow, and of little use if they had to beat against a head wind.

The sea tactics of those days depended in a great measure on the composition of the fleet, and the proportion respectively of sailing ships and vessels propelled by oars. The light and swift galleys usually formed the van, and performed the scouting duties. As the enemy approached, it became a matter of great importance to bring the heavy ships, which formed the main body of the fleet, into a good position; and it was often necessary that the galleys should tow them; these latter, then, while the ships were carrying on the action with their guns, attempted to out-flank those of the enemy, and ram them. If successful in this, the next thing was to board and to settle the contest by hand-to-hand fighting. The big ships only engaged each other, and the artillery duel, as a rule, settled the action, as they seldom could board each other. If the ships found themselves attacked by galleys, unless there was a strong breeze, it was bad for them; they were in much the same position as sailing ships would be in these days attacked by steamers; they usually then tried to form square, so that they could keep the enemy at a distance by the fire of their guns.

The Venetians had in their fleet both heavy ships and galleys. Each of these classes of ships formed a division, but they were generally attached to one another in order to counter-balance the defects of each. Between the galleys and heavy ships came the galleasses, each under a picked commander; they were the most formidable of the fighting ships, and used to open the battle. It was considered a special honour among the Venetians to command a galleass, and only the most distinguished members of noble families had the privilege of doing so.

For manning their fleet, the seafaring and coast population of the countries in the possession of the Republic afforded splendid material. The position of captains and officers was, on the other hand, held exclusively by members of the young Venetian nobility, who looked upon service at sea almost as their calling in life, feeling quite at home in pursuit of this as their avocation, in which they displayed a valour and zeal almost unique in history. The fundamental principle of the sea tactics of the Venetians was to take the offensive, regardless of consequences; they never waited to be attacked, but always did their best to forestall the enemy, and this with such impetuosity that he seldom was able to withstand it. And to this spirit of the initiative they undoubtedly owed most of their astonishing successes at sea.

The Turkish fleet was also composed of galleys and ships. One class of ships, similar to the Christian galleasses, was called "maona"; they possessed also a large number of smaller war-vessels (galleots, feluccas, brigantines, &c.) with which they could make raids on the numerous small harbours of the Ægean. All these ships were similar in build to the Venetian, but weaker, as a rule, and not so handy or fast. Although the Ottomans did not belie their inborn warlike

instincts at sea, they never attained the skill of their opponents in handling their ships or in their tactics.

The Papal and Maltese fleets consisted also of galleys similar to those of the Venetians.

The Account of the Operations.

DEAR BROTHER,

I am certain you will be glad to hear some account of the military events which have been transpiring in the Dardanelles. As you know, I was chosen, among other Knights of the Order of Malta, by the Baillie Giovanni Bichi to form one of his expeditions to the Levant.

On the 14th April, 1657, the Papal fleet left the harbour of Civita Vecchia, because His Holiness, on receipt of the news that the Turks were fitting out their ships earlier than usual, determined there should be no delay on his side. Bad weather lost us, however, much time, and we were obliged to remain at Messina until the 1st June awaiting the arrival of the Maltese squadron, which was to join us there. As we came from a part of Italy suspected of the plague, we were not allowed to enter the harbour, but had to anchor outside the lighthouse. We utilized this period of enforced idleness, exercising our crews in making the ships ready for battle, and in firing at targets with our guns and muskets. Once a brigantine appeared in the bay of San Giovanni, some 2 miles from Reggio, which the natives declared was Turkish. Admiral Bichi directed me to ascertain what she was, and, if Turkish, to capture her. Taking some trustworthy men with me in a boat, I approached as if I was a health officer, and we then found that she was from Zante, and had nothing to do with the Turks.

On the 1st June the Maltese galleys arrived, under the command of Admiral Caraffa, and, as the weather had moderated, we weighed together for the Levant. On the 14th June we effected our junction with the Venetian fleet of galleys at Chios.

Some days previously the Venetian Captain-General Mocenigo had defeated several war-ships from Barbary and captured a large number of merchant ships on their way to Constantinople with cargoes from Egypt. He had, moreover, captured by surprise the fortress of Suagih, lying some 50 miles distant from Chios, on the coast of Asia Minor, and destroyed the works.

Mocenigo did not give our Admiral a very warm greeting; in fact the whole time the Venetians distinguished themselves by their pride and arrogance. Under the pretext that Bichi came from a suspected port, Mocenigo did not even come on board to greet him, but only sent his aide-de-camp in a boat to lie off the "Capitana" (the Papal flagship), and from there to confer with the Admiral on board his ship. Mocenigo demanded to know under what rank and character Bichi commanded the Papal fleet, and whether he intended to bear the standard of the Holy Church or that of Venice. Mocenigo thus pretended that he was not aware that Pope Alexander VII had

nominated his nephew as General of the whole assembled Papal fleet, with orders, under certain circumstances, to hoist the banner of the Cross. Bichi answered to this effect, taking no notice of the discourtesy of the Venetian, but continued that he only wished to do what would be of most service to the Republic. He in this way acknowledged Mocenigo as his superior, who immediately availed himself of his position to forbid all intercourse between his own and the Papal fleet on account of the suspicion of the plague. The Maltese were similarly placed under the same restrictions, and we were caused great inconvenience. When, for example, water, wood, and provisions had to be procured, our turn always came last; we could not communicate directly with the shore, and therefore naturally received the worst and most expensive things.

On the 23rd June the combined fleet proceeded to the island of Tenedos, which had been captured from the Turks in the previous year by the Venetian Admiral Borris, who commanded a division of the fleet under the Captain-General Lorenzo Marcello. On the 25th a Christian slave arrived who had made his escape by swimming from the Anatolian shore; he had taken some hours in accomplishing the 7 miles,[1] using only to assist him a small bundle of wood, on which he had placed two arquebusses in order to attract attention by firing them. He reported that the Turks were making great preparations both by land and sea in order to recapture Tenedos, which, while it remained in the hands of the Venetians, prevented their free egress and ingress out of and into the Dardanelles. The news led to the rapid resolution on our side to forestall the Turks and forthwith to proceed to the Hellespont with the whole fleet, join the 18 large Venetian and French ships already there, and to frustrate every attempt of the enemy to put to sea.

And so it came to pass that by the 26th June our whole fleet lay at anchor off the mouth of the Dardanelles.

On the 27th June an incident[2] occurred, which I can only remember with shame and grief. One of the most pressing necessities of a fleet is drinking water, of which the heavily-manned galleys in particular require a large quantity, as the rowers, on account of the heat, drink a great deal. In the open vessels in which the water is stored it soon becomes tainted, and must therefore be renewed every few days. On the day in question the galleys and galleasses proceeded to a river which flowed into the Hellespont on the Thracian side, not far from the Castles of the Dardanelles. Some thousand soldiers were first disembarked, in order to occupy suitable points in the neighbourhood for protection, and then the rowers landed who were to perform the task of watering. The look-out of the men on guard must, however, have been very badly performed, for scarcely had the watering commenced when suddenly Turkish troops stormed in on all sides and attacked with such impetuosity that ours in a moment were overthrown. All hurried in

[1] The miles in the letter seem to have been Roman miles, and were some 200 yds. short of an English mile, being about 1⅓ km.

[2] See Plate 3, Sketch 1.

the wildest haste to the beach in order either to get into the boats or at least to find shelter under the guns of the ships. The panic was so great that many lost their weapons, and losing their heads rushed into the sea, as the boats were too few to re-embark all at the same time. The Turks, whose cavalry gave them a great advantage, immediately hurried in pursuit, arriving on the beach almost at the same time with our men and slaughtering without mercy all whom they could reach. The slaughter was even carried on in the water, and, as friend and foe swayed to and fro in a close tangle, it was impossible for the ships to use their guns. We who had remained on board the ships had to look on as helpless spectators while our brothers perished. Of the 1,000 soldiers over 200 were killed or taken prisoners, and many more wounded. The men of the working party had for the most part been got on board.

Mocenigo now showed himself, in spite of all his arrogance, a man of energy and determination. In order that the Unbelievers should not claim a triumph and to raise the courage of his own men, he moved up his whole fleet and renewed the next day the watering, and, as this time every precaution was taken, it was successfully completed. The Turks did not venture to renew their attack, and did not even show themselves. When the work was finished Mocenigo had the dead buried and a high Mass for the repose of the souls of those that had fallen was held on the bloody field of battle.

The enforced idleness, in which we were now compelled for some time to remain, caused plans for enterprises of all sorts to be matured. It was Bichi who always came forward with new proposals, as his ambition made it insufferable to him to lie inactive and perhaps to have to return home in the autumn without having accomplished anything. So, for example, it was discussed whether it would not be possible to pass by night between the two Castles of the Dardanelles, destroy the enemy's ships lying in Malega and Gallipoli—the harbours of the Hellespont—and then even attack and bombard Constantinople itself. But further consideration showed this plan to be impracticable For it was now nearly full moon, and to break through the Dardanelles could only succeed if the night was dark and the operation was of the nature of a surprise. Moreover, the big ships, which were dependent on wind and tide, would be exposed to great dangers and losses, for which no success would be likely to compensate.

But the desire for action was soon to be satisfied. On the 3rd July the whole Turkish fleet appeared coming from Constantinople, and came to anchor off the Castles of the Dardanelles. All was joy with us, for after our long inaction we could now hope for the much wished-for battle. A council of war was immediately called, at which the disposition of the fleet in case of an action was settled. Mocenigo wished to station the Papal Admiral in the third rank astern of the Maltese, but to this Bichi took great exception; the Captain-General replied that, as Bichi flew the Venetian flag, he was junior and must take his place after the Knights of Malta, who were the older allies of the Republic. On the other hand, he (Mocenigo) was ready to recognise the Papal Admiral not only as his equal, but

as the supreme commander of the whole Christian fleet, if he would hoist the standard of the Cross. It therefore seemed to Bichi that the moment had come to make use of the permission *under certain* circumstances given him by the Pope, and with great and universal rejoicing the Papal standard, *bearing in the centre the* Crucifix and on each side effigies of the Saints Peter and Paul, was unfolded at *the masthead of the "Capitana"* under salute from the whole fleet, and Bichi was now acknowledged as Commander-in-Chief by the *Venetians* and Maltese. I do not know if the sight of the Papal banner struck any terror into the hearts of the Turks, but it was certainly looked upon as auspicious by the Christian fleet. For the rest the command of Bichi was more nominal than real, as Mocenigo was not the man to let the leadership go out of his hand, and in the council of war he always carried his point.

In the meantime the need for watering had again become a matter of the first importance. We could procure it neither upon the European nor the Asiatic shore, as the whole of both coasts was now covered by Turkish troops, which made any approach impossible. It was therefore settled on the 7th July to leave the big ships to watch the Turkish fleet and to proceed with the galleys and galleasses to the island of Embros, which lay some 20 miles from the mouth of the Hellespont, and there procure water for the whole fleet. It was hoped that we should be able to get back the following night.

But scarcely had the galleys arrived at the island when a heavy easterly gale sprang up, which made a return impossible; we were, therefore, obliged to remain at anchor there until the 16th July, with what heavy hearts can be conceived. Perhaps during all this time our comrades in the big ships might be perishing of thirst. Then there was always the fear that the Turkish fleet might take advantage of the absence of our galleys and the favourable east wind to overthrow our ships and force a passage out of the Dardanelles.

On the morning of the 16th July, therefore, the six most powerful of the Venetian galleasses, laden with all the water-casks which could be spared, and manned by the strongest oarsmen, were sent off with orders at all hazards to reach the ships. They started, therefore, accompanied by our prayers for success, and succeeded, in spite of the foul wind and strong current against them running out of the Dardanelles, by unheard-of efforts, in reaching our thirsty comrades and saving them before they succumbed.

Towards evening the force of the wind somewhat abated; Bichi and Mocenigo, for fear of our big ships being defeated, therefore determined to attempt to return, although the pilots[1] declared it to be impossible, and by God's help we succeeded! On the morning of the 17th we arrived safely at the mouth of the Hellespont, some 6 miles from our big ships and 12 miles from the Castles of the Dardanelles.

The extraordinary fatigue of our rowers, who had pulled the whole night without rest, compelled us to anchor here for a while, under

[1] The pilots had the ranks of officers, and were responsible for the navigation of the ships, the captain only assuming supreme command during action.

shelter of a tongue of land of Cape Chrysias,[1] in order that the men might recover strength for the last and worst part of the voyage. But scarcely had we settled ourselves to rest when the pilot on board the Papal flag-ship "Capitana" exclaimed joyfully, "They come, they come! Make ready. The enemy's fleet is approaching!" And it was really true! We could hardly make out the Turkish ships, on account of the great distance, but it was easy to see, from the movements of our big ships, that they were preparing for battle. We had thus arrived only just in time. Had we delayed another half day at Embros we should have lost the opportunity of reaping great glory, and, what is more, our big ships might have sustained a great defeat.

None of us could understand why the Turks had not long ago attacked, as the wind which prevented our return was favourable for them, and they would only have had our big ships against them. Some thought they would not attempt anything this year, others that they were either waiting for reinforcements or else feared to fall into some trap prepared by us. A few, however, who were well acquainted with the customs of the Turks, declared that they had had to wait until the conclusion of the Festival of the Bairam. For my part, I believe that all these reasons may have had something to do with the delay, and that now the fact that the easterly gale had created a good deal of confusion among our ships—a French frigate had even broken loose from her anchors and been driven up the Hellespont—had suggested the idea that they would not meet with much resistance. Be it how it may, it is sufficient that on the morning of the 17th July their whole powerful fleet, 66 war-ships and over 150 transports, approached in order of battle.

Our ships, which had been reinforced by the six galleasses, had remarked the enemy's movements in good time, and had stood somewhat further out, and then waited determinedly the attack.[2]

In the first line came 29 of the Turkish big ships, and close behind them came five galleasses; in the second the galleys followed at a tolerable interval from the first. Lastly came the transports and armed boats. Upon our side, furthest in advance, was the galleass of the Captain Battaglia, which had to sustain the brunt of the first attack. The enemy's sailing ships went past her, but she was simultaneously attacked by the five galleasses.[3]

She succeeded in keeping three of them at a distance with her guns, but the two others ran alongside and boarded. The Turks mastered the centre part of the ship, killing there many soldiers and rowers, but their attempts to storm the poop and forecastle failed; nevertheless, the Venetians were finally in danger of being overpowered by the superior numbers of the enemy, when the galleass of Captain Foscari came to the rescue. This vessel first rammed with her spur one of the Turkish galleasses in the stern, then her crew boarded and took the Turks fighting on Battaglia's galleass in rear.

[1] See Sketch 3, O.
[2] For position of fleet see Sketch 2.
[3] Sketch 3, H.

Then the galleass of Girolamo Prioli came up, and the remaining Turks were killed or taken prisoners. The injured one of the two enemy's vessels was cast off during the fighting and drifted away with the tide; the other remained in the possession of the Venetians.

The three other Turkish galleasses, as well as the injured one, sought safety in flight, but they were pursued by the Venetians and kept under a heavy fire. In their terror of being captured, they stood towards the Thracian shore, and ran aground under the shelter of one of their powerful land batteries, which the Turks had erected after the fighting with the watering party on the 27th June. The injured one, however, did not succeed in reaching the shelter of the batteries, and was later on captured by the galleass of Captain Magnani.[1] Of the three other, two of them ran so hard ashore that the Turks were forced to abandon them, and, later on, to set them on fire, to prevent their falling into the hands of the Venetians.[2] The other one was also deserted by the Turks, but was watched from the shore. When some days later, on our departure, we attempted to set her on fire in the dark, the guard observed us and opened fire. Thus were five of the Turkish vessels rendered harmless and could take no further part in the fighting.

In the meantime, the 29 Turkish sailing-ships, in their first line, came up with ours, and the battle began here also, and in much the same way as between the galleasses. And here again, the most advanced of our ships, the "Aquila Coronata," had to bear the brunt of the first attack. She received the fire of five large Turkish three-masters, but she replied with such success that the Turks soon left her and sought safety in flight. They made all sail, and strove, by help of the fair wind and current, to escape out of the Hellespont.[3] But some of ours followed them,[4] and, as they were faster, owing to their better build, they overtook the last Turkish ship before she could reach the open sea. The Turkish Admiral's ship and one other, in order to escape capture, ran ashore on a sandbank off ancient Troy,[5] two others were set on fire by our shot, and a fifth sank. The others, also, would have been in a similar plight had not the Venetians, in their eagerness to secure booty and slaves, remained too long by the first one, and so gave the others an opportunity of escaping.

Outside, close to the entrance of the Channel, lay that ship which, during the storm of some days previous, had parted from her anchor and been driven out, a French frigate,[6] named "La Petite Fortune." In passing her all the Turkish ships opened fire upon her, but she returned it with great vigour from both broadsides, and, when the enemy's vessels were past, she followed immediately, inflicting considerable damage upon them.

So all the big ships of friends and foes disappeared from the scene, and only our galleasses and galleys remained; but the former had

[1] Sketch 3, G, and 4, P.
[2] Sketch 4, O.
[3] Sketch 3, A.
[4] Sketch 3, B.
[5] Sketch 3, C, 4, D and R.
[6] Sketch 2, D, and 3, D.

sustained damages, which necessitated their being made good, so the galleys alone held the field.

In the meanwhile the second line of the Turks had come up: 29 galleys and three galleasses, followed by a large number of smaller armed vessels. As the Turks had not heard of the return of our galleys from Embros to Cape Chrysias, and had not observed them interfere in the action, they believed that they would now be able to leave the Hellespont with their galleys, proceed to Tenedos, and recover what was, for them, an important fortress. The 150 smaller transports, which carried a considerable number of troops, were to seize the opportunity to sail for Candia, for which island the troops were destined. This fine plan was, however, foiled by the fortunate return of our galleys. The Turks were so much convinced of the impossibility of our presence that, when they at last sighted the Christian galleys, they thought they were their long-expected reinforcements of corsair vessels from Barbary. So, at least, it was reported, and, observing the confidence with which they approached us, the report seems very probable. But their joy, however great it may have been, was destined to be also short-lived.

When the approach of the enemy's galleys was reported, Mocenigo sent to Bichi and requested orders. The decision at which Bichi arrived was conceived with great skill with regard to existing circumstances. As, namely, the current, the strong breeze, and the exhaustion of the rowers made it impossible to advance upon the enemy, and as the enemy also had the wind in his favour, he determined to remain quietly where he was until the Turks had arrived off his anchorage, and then to fall upon their flank or rear. We should then have had the current and wind with us, and the enemy's galleys must either have had to take up an unfavourable position for fighting, as their retreat to the shelter of the Castles would have been cut off, or else they must have attempted to escape out of the Hellespont. In the latter case, the shoals of the Anatolian coast would have been dangerous to them, and we with our better built, faster vessels should have overhauled and destroyed them.

Unfortunately this excellent plan was not carried out as was wished. Before Bichi had transmitted his orders to Mocenigo, the latter, in his eagerness to fight, had already prematurely weighed. When he saw the long expected, and much hated, hostile fleet coming towards him so haughtily and carelessly he forgot all precautions, and, without thinking of the others, moved alone with his galleys to the attack.

Full of alarm, Bichi and Caraffa observed this, but, as they could not leave their comrades in the lurch, nothing remained but to make the signal to the rest of our fleet to attack, more to protect the Venetians than from any hope of beating the enemy; however, the latter was still so sufficiently far off that he, as soon as he recognised in our galleys his bitterest foes, was able to alter his course completely about, and seek shelter under the numerous batteries on the Anatolian coast.[1]

[1] Sketch 3, M.

And now it was plain how thoughtless Mocenigo had been. The enemy not only succeeded in their manœuvre, but among all our galleys there were only 12 (2 Venetians, 4 Papal, 6 Maltese) in a condition to stem the current and move against them, so that it was impossible our attack could be effective. The nine most powerful Turkish galleys succeeded in turning along the shore, where the current was weaker, and escaping in the direction of the Castles. We had to content ourselves with hindering them in their flight by the fire from our guns.

But the strength of our rowers was now quite exhausted, and we were compelled for two hours to anchor, in order that the unfortunate men might recruit themselves a little. After they had been inspirited by a plentiful allowance of wine and the hope of special rewards, we again made the attempt to move in the direction of the Castles, in order to prevent any further attempt of escape on the part of the Turkish ships. But after a short time our men again gave in, and we were obliged to give up the attempt and come to anchor.

In the pause which ensued, Mocenigo and Caraffa came on board the "Capitana," in order to visit Bichi, and congratulate him on the success already attained. Bichi, however, could not refrain from remarking that our success would have been still greater if his plan had been carried out. Mocenigo allowed this, but said that he waited so long for orders to be given that he was afraid the enemy would have escaped. Everyone saw, however, that this was only an excuse, and that it was Mocenigo's impetuosity which had carried him away.

After this conference the leaders returned to their ships, night soon came on, and the wind fell, as it often does at sunset.

Mocenigo, who never left the enemy's galleys for a moment unwatched, observed that five of them were about to attempt to escape home along the shore, taking advantage of the dusk and falling of the wind, so he immediately weighed again alone with his galley, in order to try and prevent them. When this was observed from the "Capitana," which lay near, Bichi determined to follow him without delay. No support was to be expected from the other galleys, as only the two Admirals' ships were sufficiently strongly manned to be able to move them.

But the pilot of the "Capitana" declared that that ship, in consequence of its great draught, could not follow the Venetian and the Turks along shore. Bichi immediately warned Mocenigo that he was running into danger alone. But scarcely had the messenger gone when one arrived from Mocenigo, that he was threatened with attack by all five of the enemy's ships, and begging for help. In spite of the danger of grounding, Bichi weighed without delay, and proceeded to the spot where he imagined, in the darkness, the Venetian "Reale" was. In the meantime the largest of the five hostile galleys, finding itself also in danger of grounding, attempted to steer more into the centre of the channel, but was caught by the current, and swung with great force against the bows of the "Reale." The Venetians immediately grappled her fast to them, and attempted to carry her by storm; but the Turks resisted with great bravery,

and there ensued here in the darkness a doubtful fight.[1] The Turkish captain conceived the bold plan of running again in shore, and taking the Venetian flag-ship with him, which would thus be lost on account of its great draught. The Turk, while the battle raged, set some sail, and both ships drifted slowly towards the shore, as the Venetians in the excitement of the battle were not aware of what had been done.

In the meantime the "Capitana" had come up,[2] and, in spite of the darkness, saw the danger of the Venetian. The latter thought she was an enemy's ship, and was about to open fire on her with chain-shot, when an old soldier exclaimed, "Hold, I see the banner of the Cross! Help comes!"

The "Capitana" now made fast to the stern of the "Reale," and attempted, by means of her oars, to tow her away from the land, while at the same time our whole crew opened fire with muskets upon the enemy from the forecastle. This fearful night action was now, by the firing and by means of lights burnt by the Venetians, so lit up that we could distinguish friend from foe. By great exertions we succeeded in rescuing the Venetian from grounding, and also decided the battle against the Turks. Those of them not slain were taken prisoners and became slaves, while we freed the Christian rowers on board the hostile ship which had become our prize. The rest of the night was spent in well-earned rest.

The four other hostile galleys, which had at the same time attempted to escape, had, in the meantime, crossed over to the other shore, where we saw them the next morning.[3] Their attempt to reach the shelter of the Castles had failed, and they had therefore run under shelter of the shore batteries.

The numerous Turkish transports, which had followed astern of the galleys, when they saw their fate, stopped, so that they for the most part remained under cover of the Dardanelles Castles.[4] Only a small number had taken refuge with the galleys on the Anatolian shore.[5]

On the next morning, the 18th July, the wind had again freshened to such an extent that nothing could be done. Both fleets were therefore obliged to lie quietly at anchor during the day, which afforded some very necessary rest to the worn-out Christians.

Towards evening the wind again went down. Scarcely had Mocenigo observed this than he was anxious to be up and doing again. He sent to Bichi and Caraffa, and proposed, under cover of the darkness, to capture the Turkish galleys lying off the Anatolian shore; or, if this was not possible, at least to set them on fire by firing red-hot shot at them.

Although Bichi and Caraffa saw the difficulties of such an undertaking in the dark, under the fire of the enemy's batteries, and on account of the shoalness of the water, yet they would not reject the proposal of the Captain-General, as they did not wish to appear less bold than he was.

[1] Sketch 3, I.
[2] Sketch 3, K.
[3] Sketch 3, L.
[4] Sketch 3, R.
[5] Sketch 3, N.

After it became dark our ships approached Barbieri Point.[1] But whether it was that we had come in the wrong direction, or that, in the darkness, the Turkish[2] ships could not be distinguished under the high land, suffice it to say that we could not find them. We were therefore obliged to give up the attempt, and return to anchor again.

When morning broke on the 19th July the Turkish ships lay still in the same place. We immediately determined again, on the proposal of Mocenigo, to renew the attempt to capture them. In spite of the heavy fire from the shore batteries, we so effectually bombarded the hostile galleys that their crews were compelled to desert them, and take to the shore in their boats; these could not take them all off, so several sprang into the sea and were drowned, their heavy equipments taking them down. We also sank some of the boats by our fire. We now launched our boats, in order by their help to tow off the deserted ships, but the strong foul wind and the heavy fire from the Turkish batteries frustrated the attempt.

The Captain-General, whose passionate desire completely to destroy the enemy gave him no peace, sent towards evening again to the Papal and Maltese Admirals with the proposal that he, with the two Venetian galleys, should attempt to bring off the Turkish vessels which lay off the Barbieri Point, while the Papal and Maltese galleys should attempt to do the same with the remainder.[3] Bichi and Caraffa showed themselves ready, but wished, in order not to miss again in the darkness, that they should steer for one common point; but, before they could come to an understanding with the Captain-General, the latter, carried away by his impatience, was already in motion.

It was still tolerably light, and, as the former attempts had shown, too early for success. But Mocenigo either wished to show what the Venetians could do—for he was very conceited on this point—or he was displaying again the same fault which had prevented our complete success the first day, namely, giving rein to his impetuosity over his judgment. As soon as he arrived within range of the enemy he opened fire on the shore batteries, but these had taken advantage of the experience gained in the previous actions, and now repeatedly struck the Venetians.

Suddenly a fearful explosion was heard, and we saw the Venetian Admiral's ship enveloped in thick smoke, in which parts of the ship and men's bodies were hurled into the air. It has never been discovered whether a ball had struck her powder magazine, whether one of the gunners had been careless, or whether one of the Turkish slaves had deliberately thrown a light into the powder. The centre of the ship was blown into the air; the fore part sank, and only the after part appeared still above the water.[4] The greatest misfortune was that the Captain-General, who had been standing close to the helmsman, was struck on the head by a splinter, and killed on the spot. The rest of the crew, both soldiers and rowers, were for the

[1] Sketch 4, K.
[2] Sketch 4, L.
[3] Sketch 3, M.
[4] Sketch 4, F.

most part killed, though some saved themselves by swimming, although the Turkish slaves and oarsmen, who, in this unexpected manner, found themselves free, attempted to slay the Venetians in the water in revenge for the discipline which had been inflicted on them.

The remaining Christian ships despatched their boats as quickly as possible to the help of the unfortunate men, but out of a crew of nearly 1,000 men, which the "Reale" carried, hardly 300 were saved. Among those saved was Francesco Mocenigo, a brother of the Captain-General, and acting as his aide-de-camp. He was conveyed, with many others, on board the "Capitana." As soon as he regained his speech—for he was half dead when saved—his first question was about the banner of the Republic, which had been hoisted on board the "Reale." He begged that it might be rescued if possible, and also the body of his brother, for he was afraid that if the Turks obtained the remains of one who had been their most dangerous and bitterest enemy, they would, even after his death, do him some dishonour. The request of Francesco Mocenigo was complied with, and not only the body of the dead Admiral, but the banner, a large sum of money, and the most important of the papers, were saved from the "Reale."

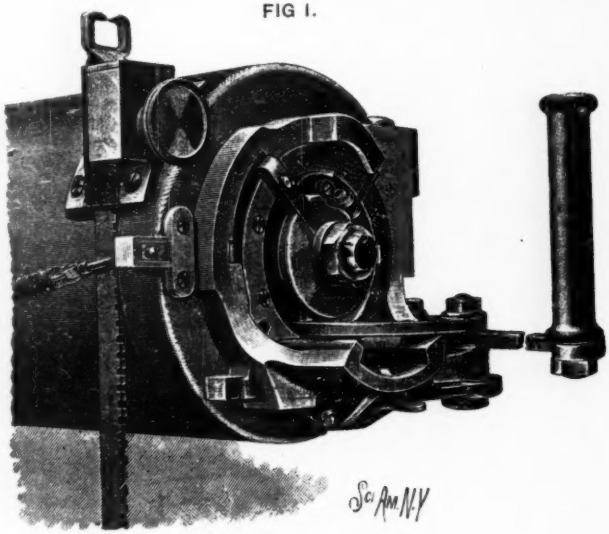
The sinking of the Venetian flag-ship had a most depressing effect upon our men, while the Turks gave vent to their joy by salvoes of artillery and musketry. The attack upon the other galleys, which, moreover, had in the interval been again taken possession of by the Turks, had to be discontinued. Also on the following day it could not be resumed, and Bichi found himself compelled to think of retiring, as provisions were running short, the big ships were still absent, and the Turks were daily strengthening their batteries. In order, however, to maintain the spirit of his own people, and not to allow the Turks to triumph over our weakness, he remained at anchor two days longer.

On the 20th July he assembled a council of war, which approved of departure, and on the 21st July, at mid-day, a start was made for Tenedos, where we should rejoin our big ships and be able to make good defects. As we departed, our galleys fired a parting salvo at the enemy, which was returned by them, but, as the distance was too great to do any harm, the whole took the form rather of a salute between the two combatants than of a battle. So our splendid fleet floated to the entrance of the Hellespont accompanied by the thunder of the guns, without oars or sail, but carried by the current slowly and majestically out to sea. Off the Point of Troy we once more came to anchor, in order to give an opportunity to the Venetian gunners, who are excellent in their speciality, to destroy the enemy's vessels lying on the shoals there.[1] They approached the vessels in boats, and soon set them in flames.

On the morning of the 22nd July we left for Tenedos, where we found the larger portion of our big ships, and on the 24th we celebrated our hard-won successes by a grand *Te Deum*.

[1] Sketch 4, C, D, R.

FIG 1.



FIG

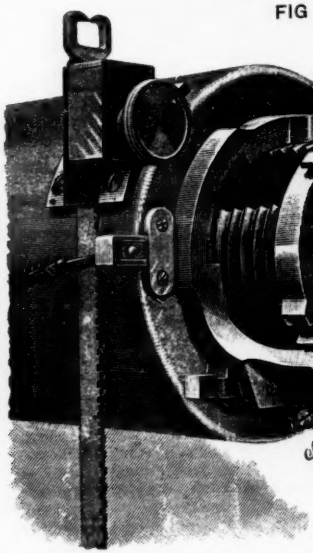


FIG 4.

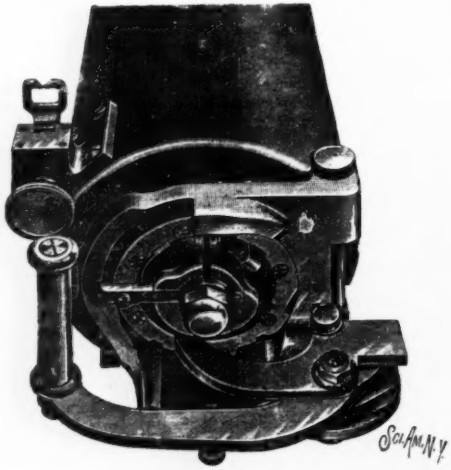
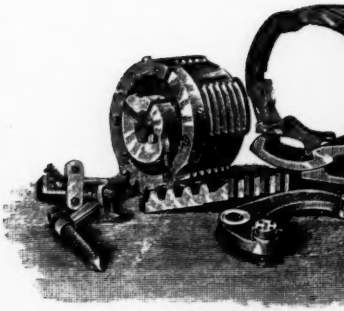


FIG 5.



LL RAPID FIRE GUN.

FIG 2.

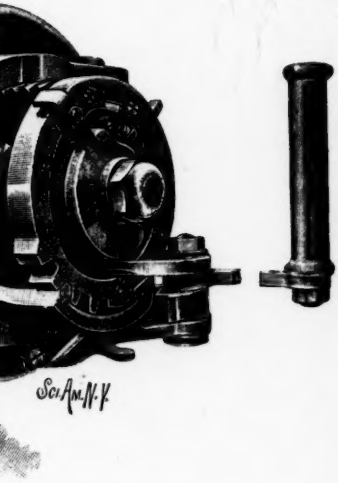
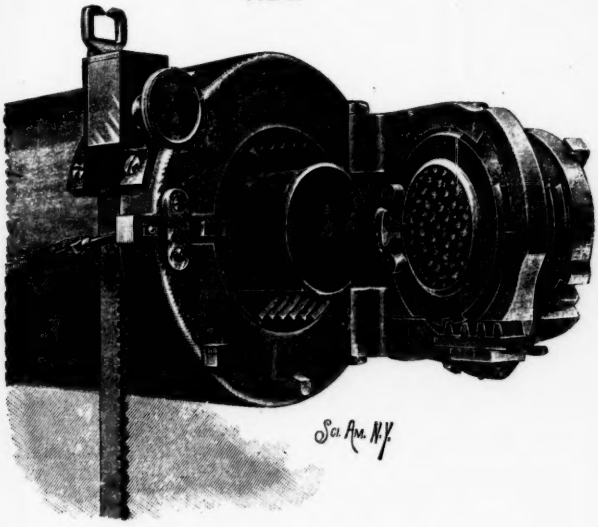
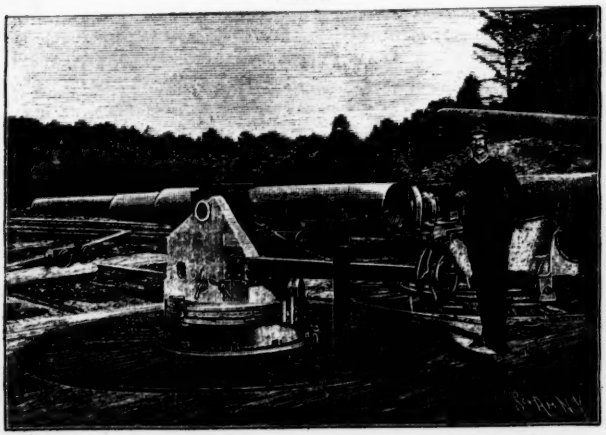


FIG 3.



G 5.

FIG 6.



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Unfortunately the death of Captain-General Mocenigo put a stop to the operations of the Venetians by sea. Bichi declared himself ready to assume again the supreme command of the fleet, but the pride of the Republic would not consent to that. So, after some weeks, we received orders from Rome to return. The Order of Malta also brought their operations at sea to a close for the year. Consequently the Turks succeeded, after they had reassembled and reorganized their fleet, in leaving the Dardanelles without let or hindrance, and in throwing large reinforcements of troops into Candia.

THE DASHIELL GUN.

We are indebted to the courtesy of the editor of the "Scientific American" for the following description and plans of the new navy rapid-fire gun:—

The rapid-fire cannon designed by Ensign R. B. Dashiell, United States Navy, having been adopted for the armament of the ships of the new navy, the following description and accompanying views of the gun and mechanism will be of interest to our readers. This design of breech closure is intended for guns of 4-, 5-, and 6-in. calibres, firing projectiles of 33, 50, and 100 lbs. respectively. All these guns use a solid-drawn metallic cartridge case with the projectile gripped in the mouth of the case, like a rifle bullet in a small-arm cartridge. Smokeless powder is used, giving velocities of over 2,500 ft. per second. The gun and its ammunition are American throughout. The cartridges are made by the Winchester Arms Co., of New Haven, and the smokeless powder by the United States Naval Torpedo Station at Newport.

The fermeture of the gun is on the slotted screw system. The plug is supported when withdrawn on a hinged tray and collar of suitable shape. All operating mechanism is carried on the tray casting, except the trigger, which is on the gun.

A curved translating arm of bell-crank lever form is pivoted on the tray at one end. A vertical toe at the other end engages an undercut score in the breech plug. When this lever swings on its pivot, the plug, if unlocked, will be withdrawn from or entered into the breech.

In the elbow of this arm is pivoted a horizontal cogged segment, formed in one piece with a long lever ending in a vertical handle or grip. A curved slot in the tray allows its pivot pin to move with the pivot of the translating arm as a centre during longitudinal motion of the plug on the tray. This cogged segment engages a series of horizontal cogs on a rack bar which slides in a groove in front of the tray. The left-hand end of this bar is provided with vertical cogs engaging another series on the lower part of the breech plug. A stop pin on the face of the breech limits the travel of the rack. The length of the rack is such that its extreme right-hand cog is immediately below the pivot pin of the translating arm when the plug is unlocked.

The usual double acting latch is fitted to the tray.

The plug being locked, a pull on the hand lever rotates the cogged segment, thus unlocking the breech plug by means of the rack bar described. As soon as the plug is unlocked, the stop pin will have checked the motion of this rack, and the centre of motion will be transferred to its right-hand cog, which is now immediately below the pivot pin of the translating arm. The arm and lever conse-

quently swing together, and the plug is withdrawn on the tray and swung to one side clear for loading. As the plug comes out, a groove, cut in its threaded lower segment, passes over the central tooth of the rack.

In returning the plug to the breech, two forces will be at work in the mechanism—one to rotate the plug, the other to push it home. The first is checked by the groove in the plug engaging the tooth of the rack mentioned and pulling the plug against the tray rib. Only the motion of translation can thus take place. As soon as it is entirely off the tray ribs the plug can revolve, but, being then home in the breech, its translating motion ceases and revolution locks it in place.

The extractor is a strong bar kept down by a mild spring. It passes through a hole in the plug so as not to interfere with the threaded parts. By utilizing a certain amount of fore and aft "lost" motion, the extractor is kept from slipping off the cartridge head at the same time that the plug, when pulled quickly to the rear through this "lost" distance, acts very powerfully as a hammer to extract the empty case. The extractor is shown in its forward or pulling position. When pushing a cartridge home, the extractor hook cannot rise and catch until it has been pushed back, by the forward motion of the plug, to its rear position. It can then snap over the rim of the case and is ready for the blow from the breech plug in extraction.

The firing mechanism consists of a straight firing pin with cone-shaped shoulder. A spiral spring actuates it, being held to its work by a loose, spool-shaped sleeve. A cocking lever is pivoted to the plug, its upper end running along a cam groove in the tray collar, while its lower end is forked to engage over the spool-shaped sleeve of the firing pin. When unlocking, this lever moves the sleeve to the rear, cocking the pin on the toe of a horizontal sear bar. When locking, the sleeve is given motion in the opposite direction, which compresses the spring, leaving the firing pin cocked. When fully locked, the outer hook of the sear engages the trigger. A cap over the rear end of firing pin prevents all danger from defective primers.

It will be seen that the gun cannot be fired unless the main-spring is compressed and the sear and trigger engaged, neither of which takes place until the last instant of locking.

The lanyard leads forward, around a pulley near the trunnions, if desired, so that the gun captain and lanyard will be out of the way of the gun servants about the breech, and the pull for firing will be independent of the elevation of the piece.

The advantages claimed for this mechanism are efficiency, with cheapness of manufacture. The quick-acting part is applicable to any gun with slotted screw fermeture in which the breech plug is worked by manual power.

The following selections from the "Annual Report of the Chief of the Bureau of Ordnance" show the behaviour of the gun in service:—

"The recently adopted breech mechanism for rapid-fire guns of 4-, 5-, and 6-in. calibres has been put to a most thorough test, with

both good and defective ammunition. 4-in. gun No. 11 was fired 248 times. The mechanism was worked about 8,000 times with tight-fitting cartridge cases. These cases had to be hammered into the gun, and were selected for the purpose of testing the extractor.

"There has been no failure in the action of any part. A test for rapidity of fire was made before the Chief of Bureau and bureau officers. Five rounds were fired in 17 secs., using experimental cases. Since then, on two occasions, five rounds have been fired in 14 secs. On the second trial the gun was laid at 10° elevation and all five projectiles were in the air together.

"Similar exhaustive trials have been held with the 5-in. rapid-fire mechanism. Five rounds have been fired, in two instances, in 19 secs. The charge and projectile made up in one weigh 95 lbs. (with brown powder), and can be easily handled by one man.

"There have been no cartridge cases as yet for the 6-in. quick-firing gun, the De Bange check being used for obturation. The 6-in. rapid-fire mechanism was tested in competition with the service mechanism by a board of which Captain J. A. Howell, United States Navy, was the senior member.

"The conditions of firing were precisely similar with each gun, the elevation 3°, service carriages, gun sponged after each round.

"The gun, with the ordinary service mechanism (Mark III), was fired 10 rounds in 5 mins. 2 secs., while that fired with the quick-acting mechanism was fired by the same crew 10 rounds in 2 mins. and 56 secs."

These guns will form the main batteries of the small cruisers and the secondary battery of the larger vessels of the navy.

MANŒUVRES: THEIR PLANNING AND EXECUTION.

By Colonel WILLE, Chef d'Arme of the Swiss Cavalry.[1]

(Translated, with the Author's permission, by Lieut.-General W. H. GOODENOUGH, C.B., R.A.)

To introduce to our readers any of the current thought of the Continental military world would seem to need no apology. It may, however, be well to remind them that Switzerland, the country from which our author writes, does not maintain any standing army, and that some of the difficulties and shortcomings he complains of are due to the conditions of the Swiss military system, which embrace a very "short service," of a peculiar kind, for officers as well as for men. The circumstances, therefore, in Switzerland and in Britain are by no means similar; nevertheless, as students of war, practising their craft under difficulties, Swiss officers' experiences may merit attention in this country as much, or more, than those of others.

As has been said in a very favourable German critique of the following pages, in the long years of peace there is a tendency to formalism. The freshness of conviction, which the lessons learnt on active service confer, becomes lost. Hence, a livelier welcome may be extended to a writer of original thought, who endeavours, by sweeping away conventional customs, to bring us back to the bed-rock of the reality which endures.

Our author does not confine himself to the question of the conduct of manœuvres alone, as the title of his treatise would imply, but presents us with a luminous view of the effect of modern arms on tactics, especially those of the artillery, which invites examination. As regards the main question of the organization of manœuvres, English readers, conversant with our own procedure, will readily perceive that, in this country, we have succeeded in avoiding some pitfalls herein indicated; this will not prevent their receiving with open mind the author's suggestions on the whole subject.

W. H. G.

THERE is no doubt that we have made greater progress in the last ten years in the field of employment and leading of troops for battle than in any other. Our army possesses leaders who justify, to the fullest extent, the confidence with which they are regarded.

The standard attained, however, is not absolute but relative; it dates up from our earlier standard. Looking at the capabilities and acquirements of our superior officers, one cannot but think that our progress might have been greater, so great that we should now be able to discard this comparison with our old imperfections and measure ourselves with those armies which ever stand to us as examples.

As I reckon, this is due to a certain set of traditional customs and conceptions; such affect standing armies as well, but without the same drawback to the training of leaders, because their officers, being of the military profession, in the ordinary course develop and consolidate in themselves the characteristics proper to counteract the evil effects of those traditions.

At all manœuvres, small or great, the unprejudiced observer is impressed by the recurrence of scenes and customs such as are admitted and possible only at peace manœuvres, and which, when it is a question of learning the art of handling troops in front of a real enemy, are not only disadvantageous, but positively induce such a way of

[1] "Über Anlage und Durchführung der Manöver." Frauenfeld: Huber, 1893.

thinking and working in leaders of troops as would unfit them for acting on real service on the spur of the moment.

Peace manœuvres compass various objects; the troops in general should acquire a fair comprehension of how things go on active service in the field and in battle, and learn the wherefore of their barrack-square drill as well as of the manifold instruction given them. Subordinate commanders should learn to suit formations to the ground met with, as means to the end, as also to realize how their own action tells when working together with others for a common aim. These manœuvres are, above all, a proof and test of the training and worth of the entire military machine throughout, in view of the supreme trial which it may have to undergo at any hour. But they are particularly a test for the higher commanders, and that not before the tribunal of their superiors alone, to whose judgment they are subjected, *but specially before that of their own selves.*

The leaders of troops have to show at peace manœuvres that they possess the first quality of army commanders—well warranted self-confidence in the soundness of their own conclusions and resolves. I know full well that to manifest this quality under the easy conditions of peace manœuvring and when before the enemy in war are two different things, and that it would be ridiculous to try and keep up the illusion that at peace manœuvres things can go on as in war; but if manœuvres are planned and worked out with the stated object in view, then the presence of this developed characteristic in the leader of troops can yet become apparent. To effect this easily and completely cannot be, but its being so difficult makes it the more imperative to further the facilities at manœuvres for manifesting this indispensable quality. But, as manœuvres are now planned and carried out, elsewhere as well as at home, little or nothing can be realized in this direction.

The troop leaders are given the opportunity of showing their deep read knowledge, but nothing more. We stick fast still in the traditions of old time—the time of pedantry, when the disciple of science draped himself and all that he did in a mysterious shroud of erudition, because, in truth, the science he professed was a thing he had never fairly grasped, and so he never got to apply it naturally, simply, and as a thing of course.

If manœuvres be watched, it will readily be noticed that situations, useless as instruction and injurious as training for war, repeat themselves.

When a tactical problem is set them, troop leaders generally begin by making out a more or less complete plan, not based on the simple facts, but deduced from a set of conclusions worked up by severe process of thought. So far as this process leads to the conviction that these conclusions are sound, the prearranged plan determines minor points of execution, and even provides for variables therein, according as one or other of some cleverly foreseen eventualities present themselves. The plan is also not infrequently discussed at the previous day's parade, or at the rendezvous, with the sub-commanders, and the several posts and duties are detailed and allotted.

This is the root of all other evils in the sequel; it is the reason why

manœuvres are no school for commanders, and do not really bring their qualifications to the test.

I am far from wishing to maintain that the commander who has a tactical scheme set him should not think it out earnestly beforehand, nor will require all his knowledge and the concentration of all his powers of thought for its solution, but the question is as to the proper moment for applying these powers; the necessary thinking out beforehand must stop short of adoption of ways and means not, as yet, justified by actual or presumed circumstances, nor by the true aspect of affairs and of the ground as they appear at the moment of action; it should do no more than lead to an anticipatory forecast of what will and must occur.

I can only think of one tactical problem in the case of which I should plan out my scheme of execution beforehand, assigning the posts and arranging the cues; that is, the siege, or the storm, of a well-known fortress.

But for all operations in the open field the method is ruinous. Here, searching reflection on the task before me, and on whatever I may come to know of the enemy and of the ground, have no other object than to put before me clearly what I want to do. The means for giving effect to my conclusion I determine later, step by step, as the situation all round becomes clearer.

The consequences of determining beforehand the solution of a tactical task are manifold.

First, more is put into the operation out of one's own head than the humble little scheme itself is adapted for. The execution becomes, consequently, studied and laboured; subtle refinements become habitual in the place of broad, simple measures, vigorously applied. This means making intellect the master where it should only be the servant—the ready, adroit slave of the masculine character.

When, before Novara, Hess, old Radetzky's clever Chief of the Staff, propounded to him an elaborate scheme for surrounding the Piedmontese army, the old man's only answer was: "My dear, let us just keep together and we shan't be beaten" ("Mein Lieber, bleiben wir hübsch bei einander, so kriegen wir keine Schläge!"). That is the quintessence of leadership in action, the simple secret of victory. To act thus needs nerve control, based on self-confidence, and by use and habit only is it acquired. But no such habit can be gained so long as commanders frame ideas beforehand how they are going to work, and lay out plans to correspond.

It is thus that scenes, almost typical, constantly recur at manœuvres.

At the very outset the troops are divided in the dearly-loved parallel columns, on the sonorous (strategical) rule—march separately, strike together. Or, given self-control enough, and the whole body operates together, the first meagre encounter is made to justify forthwith reeling off the ready-made plan. The commander is thus made habituated to a method—scattering his force, abandoning personal influence upon the course of the fight, and making his part lie in *laying on* his troops scientifically and *secundum artem* to their line of action, leaving all else confidingly to his subordinates and to Providence.

But what he has to be accustomed to is the precise opposite of this.

The deployment, the first encounter, and the contest of the several troops with the enemy will, from stage to stage, surely pull the reins of guidance ever more out of the leader's hands, abasing him to the *rôle* of interested spectator. This is unavoidable, but it is undesirable, because the longer the commander's direct influence can be made to prevail, without prejudice to the independence of subordinates, the more concentrated, united, and powerful the action. It is obligatory, then, in a rightly-conceived scheme of instruction, to strive to habituate commanders to submit but reluctantly to this natural tendency of events, not letting the reins slip through their fingers more than results naturally, by virtue of the scale of the operations, or the course of the engagement.

A further consequence of a prearranged plan of action is this:—Each subordinate commander, so soon as he comes in contact with the enemy, knows the part he is to play, and experiences no further desire to learn his chief's will, to fathom it fully, and to harmonize his own action therewith, with what others around him are doing, and with the ground as it presents itself in face of the enemy. We have then, at manœuvres, the effect of an orchestra, in which, haply, each instrument is well played, but no harmony is produced because each plays for itself, for want of a conductor's *bâton* which should keep the whole together, mark the time, and ensure each instrument joining in correctly.

Hence the shocking want, at manœuvres, of united action, of co-operation between the several fractions and the several arms, amounting to what, in reality, should hardly occur even in a surprise. And this is peculiarly apparent in the wholly inadequate and incorrect employment of the artillery.

Of recent years much complaint has been heard of the want of tactical judgment and initiative on the part of the artillery commanders. It is not to be denied that the action of the artillery at manœuvres has given ample occasion for comment; but this is not only so with us, but everywhere. The blame, also, is but in small degree to be thrown on the artillery; most of it rests with the commanders of the troops. If these accustom themselves to regard their active duties as ceasing when they have merely *set* their troops in action, abandoning the further *executive* management to sub-commanders thus (correctly?) launched, they themselves are answerable for the inaction, or false action, of their artillery; and they therewith voluntarily put away the means whereby they could keep a decisive influence on the course of the action and preserve the unity of their entire force. Artillery is the arm which produces the great effect proper to it only when directed on the main issue. To this end the commander himself must order its action, and must regulate it as the phases of the fight vary; *it is through the use of his artillery that a commander works for the fulfilment of his intentions.* But, instead of all this, we see, at manœuvres, commanders giving this arm, as all others, its initial orders, merely setting it in action and leaving it thereafter to itself. This is the reason why the specifically artillery point of view, and the lessons of the practice ground, are allowed so much play in the conduct of artillery (its choice of

positions and of targets), why it identifies itself so little with the aims of the other arms, or with the main object of the entire action, why every shade of the offensive spirit is gone from it, and it plays so minor a part all through. Yet it is precisely the field artillery which, through the enormously increased power of small arms, has acquired increased importance, and in like degree.

It is by means of a sound, rightfully-conceived employment of field artillery that a practical solution is to be found of the question of the extent and moment of the preparation of the attack by infantry fire, as well as of the fitness and feasibility of the assault by charging (Stosstaktik). In proportion as the improvement of the infantry weapon gives added strength to the defence, so does it give its great value to artillery in offence.

There is no need to enlarge on the point that, unless the attack has considerable advantage, as well in numbers as in training, in handling as in ground, it cannot advance with success until and unless the opposing infantry has not only been weakened by fire, but is also continuously, during the advance of the attacker, hindered from free use of its rapid-firing weapons. The preparation and support of the attack can indeed be compassed by infantry by its own fire, and when acting alone this arm can and must suffice for itself; but when artillery is available, this is its principal, indeed its sole, duty, and the infantry has only to put a finish to the work of the artillery by some amount of rapid firing before moving to decide the issue by the assault. Thus, in principle, in the offensive, the sole target for the artillery is the hostile infantry, at the points where it has to be subdued; thus we see how intimate is the co-operation between artillery and infantry.

The conception that every battle must begin with an artillery duel is a thing of the past. The attacker is in fault if he engages in one and so incurs the danger of weakening his artillery for its special, decisive, office.

It may well happen in the early development of a battle, during the encounter of the advanced troops, that the hostile artillery would be fired at, to prevent its operating undisturbed on our main columns of infantry; but we should never thus engage more than a part of our artillery. The old axiom that the enemy's artillery must be silenced or sufficiently subdued before the great masses of infantry are brought forward to the attack no longer suits the conditions, now that the increased value of infantry fire is cast entirely on the side of the defence. Even supposing that an advancing infantry were, as formerly, the foremost target for a defender's artillery, and that, in spite of suitable formations and of making the best use of ground, it suffered great losses, such losses would not bear comparison with the immense advantage of falling on a hostile infantry, wholly prevented by a hail of shrapnel from making its potent musketry tell against the oncoming assailant.

Thus the existing weapon of the infantry brings about an interchange of the fire aims of artillery in the attack and in the defence respectively. If this view be correct, it follows that the artillery of the

attack, after part of it has co-operated in forcing a discovery of the enemy's dispositions, should take up its position late in the day compared to what it used, and that not aside or at extreme range, as still is customary. The artillery is parcel of the line of infantry. For efficient working, and to keep in touch with the action of the infantry, its position is chosen as far forward as permissible, and no further back than the need for choosing a position out of fire compels, a need not always equally pressing. But, be these views as to the use of field artillery sound or otherwise, that does not alter the fact that, at manœuvres, the intimate co-operation of the arms is not brought out, nor do the commanders work with their artillery in any such way as corresponds with the great importance of that arm.

In seeking for the causes of these phenomena, I find the first to be in this:—*The manœuvre ground is customarily decided on and made known beforehand*, and not the director only, who has to set the schemes for the manœuvres, but the commanders, who come to be tested, sedulously reconnoitre it; nor only they, but their staff mostly accompany them, and, frequently, sub-commanders also are taken out, or zealous individuals among them go alone, or in parties, to learn their way about on the manœuvre area.

This study of the ground takes place before anyone knows the tasks he or his opponent will have to execute. The available positions are found out by this study and through the interchange of ideas, and everyone pictures for himself how, according to circumstances, they are to be dealt with in defence, or how attacked.

The inevitable consequence of such reconnoitring is that no one enters on his task with unbiassed mind in the simple natural way, nor is compelled to look at his task, and at the field before him, in the light in which they would appear were he before the enemy. The commander, once the scheme is before him, has only to select from memory, or from notes even, the case already conceived to match the given task; he lays this atop of the other as a pattern, and, possibly, will not shrink from giving the scheme a twist, on the plea of its being "his way of looking at it," to make it fit; and, although no valid reason be discoverable, either in the scheme itself or in what is known of the enemy, for any immediate determination of movements, for detaching columns, or giving sub-commanders their orders, the investigations already made supply not only the temptation to act thus prematurely and without due motive, but, in a way, give it some justification. And then the sub-commander, too, has been reconnoitring: he takes in his leader's plan and intention at once, so soon as ever he has the scheme in his hand and receives his chief's initial orders. He feels no further need to be informed as to his views, or to penetrate his intentions; everyone knows the time and rattles through his part, the only new point imposed being, mayhap, energy in carrying on the programme, even though the enemy, strange to say, does nothing whatever of what was expected of him.

Preliminary investigation of the manœuvre area, then, misleads commanders into being accustomed to dispose their forces prematurely, without compulsion from the true lie of affairs, foregoing the

power of direct personal influence over the course of the action; and sub-commanders are taught to give only half attention to orders really received, and not to endeavour to ascertain for themselves what intentions their chief may have formed in virtue of the situation.

Another cause I perceive in the *choice of the ground for manœuvres.* In no country in the world are conformation and surface conditions, whether on the higher plains or in the mountains, so unfavourable as with us, so ill adapted for giving leaders practice in operations by simple methods, vigorously, using direct personal control to the very end.

Our country, with its varied rise and fall of ground, its deep-cut water-courses, its manifold cultivation, due to small proprietorship, its small woods and marshes, and many fruit trees, presents most numerous formidable (yet not really good) positions for defence, and it hinders, both in offence and defence alike, supervision, connection, and co-operation over a front of battle. Thus our country itself invites, indeed almost prescribes, working with troops in separated detachments; that is, by artifice rather than by the strong hand, causing the whole task of the commander, indeed his pride, to be regarded as lying in giving his detachments correct direction, leaving nothing for himself to do but watch the course of events with interested eye, plume himself on his acute combinations, and vex himself, if all does not go off right through accidents "not to be foreseen when the combinations were drawn up."

I will not here investigate whether our country does make operating by such methods necessary; if it does, the fact remains that the habit of leadership after this sort, its adoption as a system, as a method, ruins all making of strong commanders: we rear Jominis and Rüstows, not Blüchers and Radetzkys.

A commander, liberally accomplished and of sound military knowledge, who, in his military training, has become accustomed to decide swiftly, who would regard any premature deployment as an offence to his second nature and as the greatest blunder and weakness, such an one, confronted with a situation where it was the only course left to him, would, no doubt, quit the direct road while still far from his enemy, and would break up his troops into detachments furnished with instructions and concerted plans. But he would do this reluctantly and against the grain, and therein lies the guarantee that he does so only when convinced of the necessity, and neither too soon nor in too great compass. A commander so endowed one may confidently see forming detachments and flanking columns, but the one who does so from habit leads his troops to destruction, whatever his acquirements and cleverness.

I perceive a third cause in *the propounding of general and special ideas.* The universal practice of issuing general and special ideas I regard as one of the relics of the old times of pedantry, which, indeed, still influence the training of our youth, and retain otherwise clear-sighted pedagogues in the honourable conviction that unless a man has had all the irregular Latin verbs forcibly drummed into him in his youth he will never be fully capable of logical thought.

The times are not so far distant when to make out a general idea, whose weighty meaning in each selected word evoked a thrill of admiration, was claimed as a high triumph of military capacity. The first thing then required of the commander was to identify himself with the general military situation, as created by the import of each word of the idea, before addressing himself to his simple tactical problem, which, considered in the plain light of day, is identical in every "military situation," namely, to beat the enemy, and not let him beat you.

Nowadays, the general idea is no longer treated with such profundity of thought. It serves more and more as decoration, and yet does harm enough by its mere existence.

However cleverly they may be worked up, general ideas at all manœuvres of troops up to the division are usually alike (it is by rare exception that the imagination evolves any other):—the force is acting as a detachment to a flank of an imaginary larger body.

In pursuance of the general idea, a number of deep-lying considerations come up to be dealt with in the measures the commander has to take; they are best designated in proper technical terms: "strategical and tactical flanks," "threatening the communications," "cutting off the line of retreat," &c.

An amount of scientism is thus thrust into the plain tactical task which simply does not belong there, and which, for the commander, deters him from realizing that it is for him to do the right thing tactically, and that all higher aims will be best served if he beats the enemy or does not let himself be beaten.

A "general idea" entails further evil consequences:

A "state of war" prevails between the opposing parties throughout the course of the manœuvres; the general idea is the thread which should effect an organic connection between the exercises of successive days. But since peace—all prescribed illusions to the contrary—remains still peace and is not war, and peace considerations of quarters, food, and other matters can never be put aside, but always have controlling importance, and yet the pervading general idea is stringently upheld, there result the strangest, most forced situations, giving rise to inapt schemes, and compelling the director of the manœuvres to an occasional interference in the dispositions of the commanders and in the course of events, better omitted in the interest of the training and credit of the leaders concerned.

It is not to be forgotten that manœuvres are play—play at what is of gravest earnest. So grave that, if made too like reality, the bounds are overstepped which separate play from trifling and from the ridiculous. This should never be lost sight of in arranging manœuvres; only so can we avoid the ever-present danger of giving them too much of the character of war, whence a conception of affairs and scenes most unlike war are created.

Finally, the faults we blame at manœuvres are due to the *preponderatingly theoretical training of our officers* for the business of practical leadership. I am far from throwing doubt on the great value of theoretic training, or from thinking otherwise than that the

training in our central schools is excellent, purposeful, and well adapted to its aims. But theoretic schooling and practical indoctrination draw one on the other, and the balance between the two must, therefore, be steadily maintained. I do not hesitate to declare that for the leader of troops, as, indeed, in every art, the development of capability through actual practice is more to the purpose than learning up theoretically what ought to be; and, when time and means are insufficient for both to be brought to a high standard of excellence, it is better to subordinate the expansion of knowledge to expertness in action. If the knowledge of what should be done is greater than the capability or the aptitude for getting it done, the result is impotence, or, at best, action which is confused and disturbed, there being more to be brought out than there is power to bring out. All work of a vigorous fruitful character is damped and discouraged. The faculty of sharp criticism of others is taught: art critics are created, not artists.

To this the preponderance of the theoretical in the training of our leaders of troops brings us. They learn much too much, and their work would be fresher and stronger, and yet better thought out, if they learnt less and knew less. Not till they have had much more opportunity given them of practical work will the teaching of our central schools have its great value. It will then cease to threaten the engendering false injurious habits and views on troop-leading in battle, as it now does. The danger referred to is the belief that troop-leading consists merely in this: that the solution of a given problem is to be thought out by the light of all one's acquired knowledge, after a thorough study of the ground and weighing of all chances, and that as to the unknown quantity—"what the enemy is about and the where and how he is to be met with"—that is to be fitted in as determined by one's self, by interpolation.

Further, so long as theoretical training is not constantly checked by practical exercises, the ground is never estimated by any but a false method, that is, by near inspection and from both sides; and, in judging the opportunities it offers to the enemy, from his side—a thing never possible in reality.

In sum, nothing can be thoroughly learnt by this teaching except the first distribution—the carrying on of a fight, never; hence the general failure to realize that the moment for a commander to make his dispositions for the development of his strength, and for the conduct of the fight, is after the action has begun.

If these are the causes, the methods of counteracting them follow of themselves.

The ground on which manœuvres are to be held should never be made known beforehand. At the outset the troops should be brought to the neighbourhood by march, as on service, of several days' duration, and by railway transport under service conditions, and the first day's work should hinge directly on such march.

For a series of years ground should be carefully selected, such as compels simple broad handling of troops, so capable of easy supervision as to be favourable to unity of direction and to the combined

action of all fractions and all arms, and where the employment of separated columns would be obviously out of place.

No general ideas to be issued for the manœuvres; instead thereof the commander should receive an instruction (*Auftrag*) immediately before the action; this will not prevent practice in outpost duty, nor that the exercises of successive days should be connected. These instructions to be always devised so that the engagements grow out of the collision (*rencontre*), or, at least, that it should always be for the commander himself to decide whether, according to the task set him, the situation of his troops, and the configuration of the ground, he should act on the offensive or the defensive.

Let manœuvres be arranged on these principles and they become a school for the troop leader; he will then have opportunity to practise coming to a decision, and that a rapid decision, such as he would have to exercise in reality, "from the saddle."

The first thing to consider will always be:—Does it lie in the nature of the instruction to act offensively or defensively?

In the latter case I have to determine—according to what I learn of the enemy from what is imparted by the scheme before me, from reports of outposts and patrols, from the study of the map, and from my own or my staff officers' cursory reconnaissance of the country immediately around me—whether I have to stand my ground, advance, or retire. Hereon I base my first rapid dispositions, and, under cover of these, pursue that examination of the ground which the purpose of making a defensive fight entails, and I spare myself all further measures until the arrival of the enemy and the collision: they belong to the carrying on of the fight.

If the scheme before me is offensive in its nature, or in general prescribes an onward march only, then, being in entire ignorance of the place and of the ground where the first contact with the enemy is to occur, my first orders can only extend to the simple advance in the natural direction, that is, on the main direct road, and to the protection of this march, as well as to the feeling for the enemy. It is only when the head of the column encounters the enemy, and fails, in spite of strenuous forward pressure, to drive him back, when the feelers have reported the position and the direction of the march of the opposing masses, that the time has come for the commander to determine how to act.

This determination has to be come to rapidly; it is decisive. The prosecution thereof follows later; that is a question of the details of execution only. In coming to this determination the commander has for only basis to work on the reports of his patrols, the development of the engagement by his advanced troops, the configuration of the ground as presented to his view from the point of outlook he has selected, completed by his knowledge of the map and the confidence he may be able to repose in the justice of the conclusions he has arrived at.

For the higher commanders to acquire this confidence in themselves is the object of manœuvres. They cannot acquire it in proper measure at manœuvres as now planned and executed.

NAVAL AND MILITARY NOTES.

NAVAL.

Home.—The "Resolution," which left Plymouth on the 18th ult., had to put back, owing to the heavy weather experienced in the Bay of Biscay; she is to have defects made good before she leaves again to join the Channel Squadron. The "Howe" has arrived at Malta to join the Mediterranean Fleet, and has not temporarily joined the Channel Squadron, as was first intended.

The new battle-ships "Royal Oak" and "Revenge" have successfully completed their steam trials. On the natural draught trials of the first, her engines developed 9,221 I.H.P., and a speed of 16·5 knots was realized with ·27 in. of air pressure. Though the propelling engines of the "Royal Oak" are substantially of the same type as those of the other ships of the "Royal Sovereign" class, they differ in some respects, and more especially as regards the framing, from the machinery supplied by other makers (she was built and engined by Messrs. Laird, of Birkenhead). The cylinders are entirely supported upon wrought steel columns, strongly and substantially braced together, the guides being attached by cross-beams to the main columns. This arrangement gives a light and novel appearance to the machinery, affords a practically uninterrupted view of all the moving parts, and brings home to the mind a more distinct impression of the magnitude and power of the mechanical equipment of a battle-ship than the ordinary arrangement. During the trials this framing proved to be absolutely rigid and stiff, with a great saving of weight. The triple-expansion cylinders of each engine are 40 in., 59 in., and 88 in. in diameter, with a stroke of 51 in. The slide valves of the high and intermediate cylinders are of the piston type, while the low-pressure cylinders are fitted with flat double-ported valves, a special type of relief-ring being attached at the back. Balance cylinders are also fitted to the high-pressure and intermediate valves, and assistant cylinders to the low, for the purpose of reducing the strains as far as possible. The main condensers have a collective cooling surface of 14,500 sq. ft., the circulating water being forced through the tubes by four centrifugal pumps, driven by independent engines. The crank shafts are in three separate pieces, the cranks themselves being set at an angle of 120° to one another. Steam is generated in eight single-ended cylindrical boilers, having each a working pressure of 155 lbs. The total grate surface is 710 sq. ft., and the aggregate heating surface 20,174 sq. ft. For the purpose of shutting off each combustion chamber from the rest, and of regulating the draught, separate dampers are fitted in the passage from each chamber through the smoke boxes, while gear is arranged to work the same from the stokehold floor. The following are the means of the four hours' run under forced draught:—Steam in boilers, 145·8 lbs.; vacuum, 28·5 in. starboard, and 28·4 in. port; I.H.P., 5,689 starboard, and 5,882 port; collective I.H.P., 11,571, the excess over the contract, which was easily obtained, being 571; average air pressure, ·98 of an inch, the maximum air pressure allowed being 2 in. The mean speed was 18·2 knots, but, as the ship was drawing 2 ft. 6 in. less than her normal load draught, the result is no criterion of her real speed. The natural draught trial of the "Revenge" was carried out on the 14th November with the following results:—I.H.P., 9,177, the contract power being 9,000; speed, 17·2 knots—the ship was, however, 2 ft. light of her proper trim; the mean boiler pressure was 149·8 lbs., the revolutions 96 per minute, and the mean vacuum 28¼ in. and 28·3 in. The trial was conducted with ·19 in. of air pressure in the

stokeholds, and the coal consumption was 1·95 lbs. per H.P. developed. At the forced draught trial the contract of 11,000 H.P. was exceeded by 524 H.P., with a vacuum of 28 and 28½ in. The revolutions per minute were 101 starboard, and 102 port; the pressure of steam in boilers was 146·8 lbs., and only ·46 in. of air pressure was employed. The speed was 17·5 by patent log, but as the ship was not within 2 ft. of her proper load-draught, the speed attained was no criterion of the real speed of the ship. The "Royal Oak" and the "Revenge" are the last of the new battle-ships of the "Royal Sovereign" class to be steamed, and it is satisfactory to know that the whole of them have passed successfully through their trials.

The new 2nd class cruiser "Astræa" has also completed her steam trials satisfactorily. The results of the eight hours' run under natural draught on the 16th ult. were as follows:—Mean steam in boilers, 147 lbs.; vacuum, starboard, 27·2, port, 27 in.; revolutions, starboard, 130·5, port, 130·8; air pressure, ·44 of an inch; I.H.P., starboard, 3,811, port, 3,789—total, 7,600; speed by log, 19 knots. The estimated contract I.H.P. was 7,600, and the speed 18·2 knots, so that the vessel exceeded the contract power by 600, and the speed by ·8 of a knot. At the starting and stopping trials the following results were shown:—Stopped from full speed ahead in five seconds, and from full speed astern in six seconds. From full speed astern the vessel recovered her rate of full speed ahead in eight seconds. The forced draught trials were carried out on the 8th ult. The mean results for the four hours' run were:—Mean steam in boilers, 149 lbs.; vacuum, starboard, 24, port, 25·3 in.; revolutions, starboard, 138·1, port, 138·5; air pressure, 1·44 in.; I.H.P., starboard, 4,437, port, 4,675—total, 9,112, being 112 over the contract; speed by log, 19·75, or ·5 of a knot over the estimated speed. The results were considered very satisfactory, as the ship was down to her load-draught, and there were a strong breeze and a heavy sea running during the trial.

The 2nd class cruiser "Forte" was launched at Chatham on the 11th December. She is of the improved "Latona" type, and is the last of the 29 2nd class cruisers under the Naval Defence Act of 1889 to take the water. The new 1st class cruiser "Grafton" at the same port has been passed into the A Division of the Fleet Reserve, ready for commissioning.

The 2nd class cruiser "Bonaventura," which was to have taken the place of the "Orlando" as flag-ship in Australia, is now to relieve the "Boadicea" as flag-ship in the East Indies.

The new tubulous boilers for the 1st class torpedo-gunboat "Sharpshooter" have been received at Keyham from the makers, Messrs. Belleville & Co., of St. Denis, France, and the work of fitting them in place has been commenced. The ease with which repairs to these boilers can be effected is shown from the fact that a boiler may be shut off from the others, emptied, any set of tubes disconnected by merely breaking the joints, brought out into the stokehold, and any one tube taken out by cutting through the screwed socket connecting it to the front junction-box, and unscrewing it from the back box. A new tube and socket can then be inserted, the boiler refilled, and steam again raised in about six hours, the whole work being done by one skilled engine-room artificer assisted by stokers. The advantages of these water-tube boilers over those of the ordinary type are:—1. That higher working pressures can be obtained than are practical with ordinary boilers. 2. That they are economical to maintain. 3. That they are less liable than ordinary boilers to derangement or damage through accident or neglect; and also that, even in case of rupture, the damage which would result would be much less than with ordinary boilers, owing to the much less quantity of water they contain. The new cruiser "Powerful" is to be fitted with boilers of the "Belleville" type, which will be constructed in England.

We have taken from the "Times" the following account of an important series

of experiments in gunnery and kindred subjects which has recently been completed at Silloth, on the range belonging to Sir William Armstrong, Mitchell, and Company, in the presence of a large number of representatives of several European Powers, of the United States, and of Japan, for the purpose of exhibiting the latest results which have been obtained at Elswick in the improvement of artillery. The visitors devoted the first two days of the proceedings to an inspection of the works at Elswick, where their attention was especially directed to the process of winding steel wire or riband around a gun, which is known as the riband method of construction, and which has lately come into increased prominence as a means of affording the greater strength to the front portions of the tube which is required in order to meet the strain thrown upon these parts by cordite and other slow-burning powders. Besides various processes, the action of quick-firing guns of different calibres was exhibited by drilled crews, who went through the motions of firing four rounds from the 6-in. gun in 20 seconds, and seven rounds from the 4·7-in. in 25 seconds. An 8-in. gun was also shown, which is mounted and counterbalanced much on the same principle, but in which a cartridge cannot be employed. The training, elevating, and firing are accomplished as easily as in the smaller pieces, but longer time is required for loading, so that only three rounds could be fired in 30 seconds. In order to judge of the value of this performance, it is necessary to remember that, with the present 8-in. Service gun, which is a much less powerful weapon, it is not possible to fire more quickly than one round per minute.

On the second day, after seeing the work of the largest hydraulic presses, the visitors were shown a new form of torpedo-gun. A trough had been constructed in one of the long shops at Elswick, and a dummy torpedo was fired into it in order to demonstrate that, by the use of cordite as a propellent, a very high velocity can uniformly be obtained, and that with an entire absence of smoke or fouling. In the afternoon, as soon as it became sufficiently dark, a new form of naval search-light was exhibited, on the highly ingenious platform recently invented by Mr. Beauchamp Tower. This contrivance proved to be of great interest, as it obviated the uncertain direction of the light ordinarily produced by the rolling of any vessel which carries it. The platform rests upon pistons working in hydraulic cylinders, and is further supported upon a kind of gyroscope. The apparatus was placed on board a small vessel, and a beam of light was directed upon an object in the water. The vessel was then caused to roll violently; but, in spite of the rolling, the beam remained directed upon the object as steadily as if the light had been upon the jetty. The apparatus was then thrown out of gear, so that the search-light became an ordinary fitting; and it was then shown to be useless while the boat was rolling, it being no longer possible to keep the beam directed upon the object even for a moment.

At Silloth, on the third day, the first exhibit was a 10-in. 30-ton gun fitted with automatic breech mechanism. When this gun is fired, the recoil energy is utilized for opening the breech screw, and for compressing a spiral spring which is capable of closing it again. There is, therefore, no delay in opening the breech after the discharge; and, as soon as the loading is completed, it is only necessary to pull a small lever which releases the compressed spring, by which the breech is closed and turned instantly. Three rounds were fired from this gun to show the rapidity with which it could be handled, and then the party moved on to a field howitzer, of 4·7 in. calibre and firing a 40-lb. shot, so constructed that the carriage anchors itself by the first discharge, which drives a spade-shaped blade into the ground at an angle, the piece itself afterwards recoiling within a jacket which surrounds it. Several rounds were fired from this howitzer, both by direct and by high-angle fire; and attention was then called to a quick-firing field gun, using cartridges, in which the carriage is anchored in a similar manner, and the energy of the recoil is absorbed by means of an hydraulic press. After the first round, which is employed to fix the anchor, the recoil amounted to only 8 in. Five rounds were fired with shrapnel for rapidity, and were completed in 53 seconds with very pretty effect, for one shrapnel had scarcely burst and scattered its bullets all round a target placed at a distance of 1,000 yds., when another followed on the same track. This gun throws a shell weighing 15 lbs., and carries 36 cartridges, but the total weight has

been, nevertheless, reduced to 32 cwt., while the Service gun of the same calibre, without cartridges, weighs 38 cwt. Other field guns followed, and among them a 15-pr. mountain screw howitzer, constructed to take to pieces, so that none of the mules carrying it should have a load in excess of 200 lbs. When the visitors were brought to this gun it was lying in two pieces on the ground, as it would be when taken off the mules' backs. In five minutes it was screwed together, and was on its carriage ready for firing. Both shrapnel and segment shell were used; and the practice at a target 1,500 yds. distant was greeted with much applause. Another novelty was a 6-in. gun on a light portable disappearing mounting, which was shown in position behind a parapet erected for the purpose. This mounting is designed for transport in a siege train. It can readily be taken to pieces so that the heaviest load does not exceed 3 tons, and yet it can be readily erected; the time required, if plenty of labour is available, being about 10 hours, so that the whole thing could be made ready for firing in the course of one night. Several rounds were fired from this gun; and, after each, the recoil brought it down into loading position with perfect correctness. The mounting is on the spring principle—that is to say, the gun is raised again after loading by a strong spiral spring, so that no air-pressure is employed, and there is nothing to get out of order. Spare springs can easily be carried as part of the equipment; and a broken or imperfect spring could be replaced in a few minutes.

The visitors were then shown the action of a 6-in. naval quick-firing gun on a new mounting, with the object of displaying the ease with which this mounting could be handled. Five rounds were fired, each at a different range and at a different target, so that not only had the sights to be corrected after each round, but the training and elevation had also to be altered. Under these adverse conditions the five rounds were fired in 69 seconds, and excellent practice was made. A 4·7-in. gun on a pedestal mounting was then fired for rapidity, the shots being all directed at a target 1,000 yds. distant. The time consumed in firing five rounds was 22 seconds; and the target, which consisted only of a cask with a flagstaff on it, was knocked to pieces by the second shot. This 4·7-in. gun is of a more powerful type than that used in the British navy, the velocity obtained from it being 2,500 ft. as against 2,150 ft. Other improvements in mounting were shown, and were followed by a trial of great interest against a special steel plate manufactured by a new method at Elswick. The plate was little more than a fifth (0·223) of an inch in thickness, and was designed to form the shield of a small gun, such as would be used in a torpedo-catcher, or in any position in which the reduction of weight was a matter of primary importance. By way of contrast, a second plate of the same thickness, of good ordinary steel of Admiralty quality, was fired at at the same time. Each plate measured 2 ft. 6 in. by 1 ft. 6 in., and each was subjected to 10 rounds from a magazine rifle, and 160 rounds from a Gatling gun, at a range of 100 yds. In each case every shot was put upon the the plate at which it was aimed, with the result that not a single bullet penetrated the special plate. With the ordinary plate every bullet from the magazine rifle penetrated both the steel and the wood backing, and the stream from the Gatling gun tore a large hole through the centre and practically cut it in two. The proceedings terminated by the exhibition of a new range-finder, invented by Messrs. Barr and Stroud, which was manipulated with great facility and was found to give remarkably accurate results. The visitors amused themselves by taking the distances of many of the surrounding objects, including those of ships entering or leaving the harbour.

France.—The new 1st class battle-ship "Brennus" has been put in commission at Lorient to undergo her steam and other trials; should they prove satisfactory, she will eventually proceed to Toulon to strengthen the Mediterranean Fleet. ("Le Petit Var.")

Rear-Admiral Dupuis has been appointed to succeed Rear-Admiral Humann in the command in China, with Capitaine-de-Vaisseau Thounens as his Chief-of-the Staff, and the armoured cruiser "Bayard" has been commissioned at Toulon as his flag-ship, to relieve the "Triomphante," a similar ship, which, however, instead of

returning to France, will be placed in reserve at Saigon; this is a new departure. ("Le Yacht.")

It has been decided that the ships of the Active and Reserve Squadrons of the Mediterranean and Channel Squadron, placed *en disponibilité* during the winter months, shall be completed to their full complements on the 1st of April, in readiness for the summer cruises and manœuvres. ("Le Petit Var.")

The new torpilleur-de-haute-mer "Chevalier" has been commissioned at Cherbourg and has proceeded to join the Active Division of the Mediterranean Squadron; she was built by M. Normand, and has proved herself at her late trials the fastest of the new torpilleurs, having averaged 27·2 knots. ("Le Yacht.")

The following vessels are to be commissioned during the ensuing quarter: For steam trials, the 1st class armoured cruiser "Charner," the new coast-defence battle-ship "Jemmapes" at Brest, the new 2nd class cruiser "Suchet" at Toulon, the new torpedo cruiser "Fleurus" at Cherbourg, the new torpedo-aviso "D'Iberville" at Brest, the 1st class cruiser "Tourville" at Brest, and the 3rd class cruiser "D'Estaing" at Rochefort; these last two vessels are of an old type, but have been undergoing repairs and receiving new armaments. For definite commission: the battle-ship "Amiral Duperré" at Toulon, for the Reserve Squadron; this ship lately belonged to the Active Squadron of the Mediterranean Fleet, but was placed *en disponibilité* in November to receive her new armament of Q.F. guns; her place in the Active Squadron is to be taken by the "Brennus"; the 1st class barbette cruiser "Jean Bart," which, since her return from the Columbus celebration at New York, has been also having her new armament of Q.F. guns fitted at Rochefort, is to join the Channel Squadron; and the 2nd class cruiser "Coëtlogon," at Brest, is to proceed to join the Active Squadron of the Mediterranean; while the 1st class battery cruiser "Sfax," at Toulon, joins the Mediterranean Reserve Division; both the last-named vessels have been having the new Q.F. guns placed on board. The 1st class battery cruiser "Duquesne" at Lorient is to relieve the "Aréthuse" in the Atlantic Division. ("La Marine de France.")

The sum voted in the Budget for 1894 for the expenses of the "Défense Mobile" is 6,583,797 fr.; this is rather in excess of the amounts voted in previous years. In 1894 there will be 173 torpedo-boats in commission and reserve attached to the "Défense Mobile" round the coasts; fully commissioned 23 1st class, 27 2nd class, and 9 3rd class boats; *en disponibilité*, 27 1st class, 54 2nd class, and 28 3rd class boats, with 6 torpilleurs-vedettes. These torpedo-boats are thus distributed:—1st Arrondissement, Cherbourg—in commission, 4 1st and 4 2nd, with 13 1st and 16 3rd in reserve; at Dunkirk—2 1st and 2 2nd in commission, with 2 1st in reserve. 2nd Arrondissement, Brest—2 1st, 4 2nd, and 2 3rd in commission; 3 1st, 5 2nd, and 8 3rd in reserve. 3rd Arrondissement, Lorient—3 2nd, 2 3rd in commission; 3 2nd and 7 3rd in reserve. 4th Arrondissement, Rochefort—1 1st, 1 2nd, and 3 3rd in commission; 6 2nd and 5 3rd in reserve; 5th Arrondissement, Toulon—3 1st, 4 2nd, 2 3rd in commission; 8 1st, 17 2nd, and 8 3rd, with 6 torpilleur-vedettes in reserve; Corsica—4 1st and 4 2nd in commission; Algiers—3 1st and 3 2nd in commission, with 4 2nd in reserve; Bona—3 1st and 2 2nd in commission; in reserve, 1 1st and 3 2nd. At Dunkirk the armoured gunboat "Flamme" is the depôt ship, and vessels with tenders are stationed at the other ports for this purpose, except at Algiers and Bona, where no provision is made. The total strength of the personnel assigned to the mobile and fixed defence is 2,770 officers and men, including 5 captains, 15 commanders, 95 lieutenants, 29 midshipmen, and 19 principal engineers. ("Le Petit Var.")

An arrangement has been introduced by Messrs. Schneider's firm in France on board the new battle-ship "Charles Martel" which marks a decided advance in naval gunnery. It consists of a system of toothed quadrants and levers which are worked by the automatic run out of the gun after recoil on discharge, these quadrants work-

ing a system of endless pitch chain over pulleys for lifting the charge and swinging the loading tray with the charge up to the loading position in rear of the gun. By this arrangement the energy of recoil is utilized for lifting the charges in succession up through the ammunition tube and bringing them into position for loading, causing a great saving of power and a more regular supply of ammunition, as every shot prepares the next for loading. In any case, the first step in the direction of a practical utilization of the energy of recoil for this purpose has been taken, and we may soon expect improvements in constructive details, as no doubt of its practical possibility can be longer entertained. ("Mittheilungen aus dem Gebiete des Seewesens.").

Germany.—By an order of the Emperor, the following will be the classification of the ships of the Imperial Navy for the future.

In the 1st Category will be comprised the sea-going battle-ships (Hochseepanzer), sub-divided into three classes:—

1st Class: Vessels of 10,000 tons and upwards, of which at present there are four—the "Kurfürst Friedrich Wilhelm," "Brandenburg," "Weissenburg," and "Wörth."

2nd Class: Vessels from 7,500 to 10,000 tons displacement; of these there are three—the "König Wilhelm," "Kaiser," and "Deutschland."

3rd Class: Those from 5,000 to 7,500 tons, of which there are seven—the "Preussen," "Friedrich der Grosse," "Baden," "Bayern," "Sachsen," "Württemberg," and "Oldenburg."

The 2nd Category comprises the coast-defence armour-clads (Küstenpanzer), and is composed of vessels of the 4th class of from 3,000 to 5,000 tons displacement. Of these there are eight—the "Siegfried," "Beowulf," "Frithjof," "Hildebrandt." "Heimdal" and "S 2," "T 2," "V 2" (vessels under construction but not yet named).

In this category are also included the armoured gunboats (Panzer Kanonenboote) of a displacement less than 3,000 tons. There are thirteen of these—"Wespe," "Viper," "Biene," "Mücke," "Skorpion," "Basilisk," "Camäleon," "Crocodil," "Salamander," "Natter," "Hummel," "Brummer," and "Bremse."

The category of the cruisers comes next; these are divided like the armour-clads into four classes, their classification being determined by the nature of their armament.

1st Class: Vessels carrying guns of a calibre of not less than 21 cm. (8·26 in.) with deck and side armour. Of this class there are none at present.

2nd Class: Vessels carrying guns of not less than 15 cm. and having armoured decks. Of these there are four—the "Kaiserin Augusta," "Irene," "Prinzess Wilhelm," and "Gesion."

3rd Class: Deck-protected vessels with guns of less than 15 cm., but, in addition, the old corvettes "Arcona," "Alexandrine," "Olga," "Marie," "Sophie," and "Freya" are also included.

4th Class: Unprotected vessels with guns of less than 15 cm. and of not less than 1,000 tons displacement, viz., the "Seeadler," "Condor," "Cormoran," "Falke," "Bussard," "Schwalbe," "Sperber," and "F" in course of construction.

In the 4th Category are placed the gunboats (Kanonenboote) of less than 1,000 tons displacement—the "Habicht," "Wolf," "Iltis," "Hyäne," and "Loreley."

In the 5th Category come the aviso-torpilleurs the "Kaiseradler," "Greif," "Blitz," "Pfeil," "Wacht," "Jagd," "Zieten," "Meteor," and "Komet."

The 6th Category is composed of the division torpedo-boats, and the 7th of the torpedo-boats.

The 8th includes all the school- and training-ships, viz.: the "Mars," "Leipzig," "Charlotte," "Stosch," "Stein," "Moltke," "Gneisenau," "Blücher," "Nixe," "Rhein," "Carola," "Ulan," "Grille," "Hay," and "Otter."

Finally, in the 9th are placed vessels employed on special service—the Imperial yacht "Hohenzollern," the torpedo-transport "Pelikan," the surveying-ships "Möwe," "Nautilus," and "Albatross," and the harbour-ships "Friedrich Karl," "Kronprinz," "Arminius," and "Luise."

Journal R.U.S.Institution
Vol XXXVIII.

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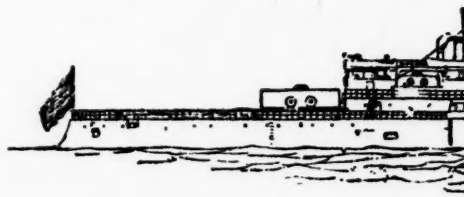

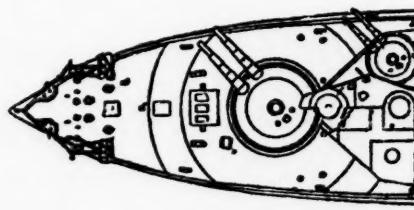

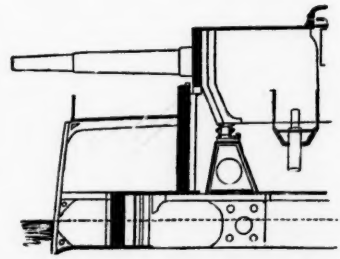

SECTION THROUGH TURRET,
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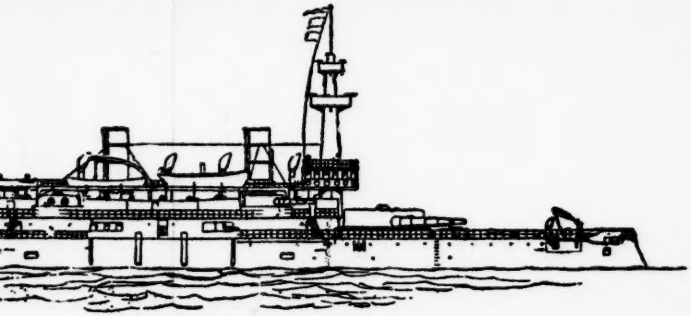

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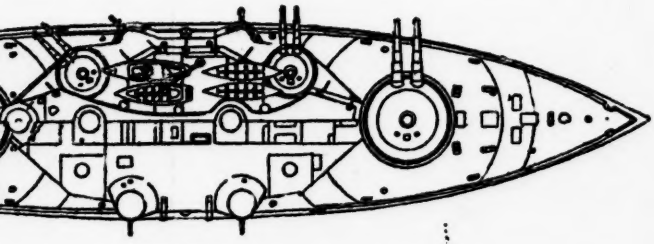

DECK PLAN.

URRET,
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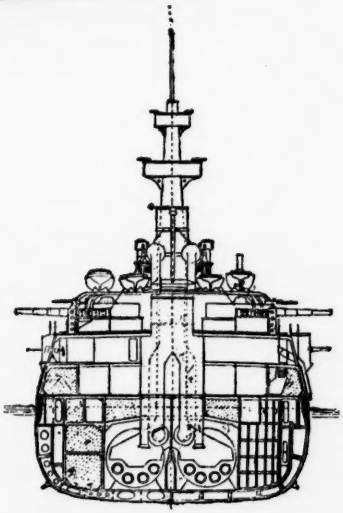

MIDSHIP SECTION.
(ARMOUR BELT IN BLACK.)

HARRISON & SONS, LITH. ST MARTINS LANE, W.C.

The following is the disposition of the German fleet for the winter months of 1893–94:—

The "Manœuvre Fleet," under the command of Vice-Admiral Schröder, with Captain Diederichsen as his Chief-of-the-Staff, consists of the following battle-ships:—1st Division—"Baden" (flag-ship), "Bayern," "Sachsen," "Württemberg." 2nd Division—"König Wilhelm" (flag-ship of Rear-Admiral Karcher), "Deutschland," "Friedrich der Grosse," and "Brandenburg"; the last-named is the first of the new large battle-ships completed for the German navy, and has to complete her steam and other trials. The coast-defence battle-ships "Frithjof" and "Beowulf," the latter with a reduced crew, form the reserve division of the Baltic. The torpedo-boat reserve divisions are constituted as follows:—For the North Sea—1st Division, division-boat "D 1" and torpedo-boats "S 7" to "S 14"; 3rd Division, division-boat "D 4" and torpedo-boats "S 24" to S 31"; 5th Division, division-boat "D 3" and torpedo-boats "S 33" to "S 41." For the Baltic—2nd Division, division-boat "D 8" and torpedo-boats "S 66" to "S 73"; 4th Division, division-boat "D 6" and torpedo-boats "S 50" to "S 57"; 6th Division, division-boat "D 2" and torpedo-boats "S 15" to "S 22." The so-called division-boats act as flag-ships to their divisions; they carry supplies, undertake small repairs, and accommodate the staff of the divisions. Division-boats 1 and 2 are 185·3 ft. long, 250 tons displacement, and have a speed of 21 knots; 3 and 4 are 188 ft. long, 300 tons, and have also a speed of 21 knots, but all four boats have a radius of action of 2,500 miles at 10 knots; "D 6" is 190 ft. long, 320 tons, with engines of 3,500 I.H.P., and a speed of 23 knots, while "D 8" is one of the largest type, 213 ft. long, 350 tons, with engines of 4,000 I.H.P., and a speed of 26 knots; she also carries four 6-pr. Q.F. and two 1-pr. Q.F. guns with 3 torpedo-tubes.

As sea-going training-ships for cadets, the cruiser-frigates "Stosch" and "Stein," and, for boys, the "Moltke" and "Nixe," have been commissioned. For the gunnery school, the frigate "Mars" and the corvette "Carola" remain devoted to this service, as they have been for some years past, as also the "Blücher," for torpedo instruction.[1] The new battle-ships "Wörth" and "Hildebrandt" will also be temporarily commissioned to undergo their trials. The ships employed on foreign stations are the cruisers "Arcona," "Alexandrine," "Marie," "Bussard," "Falke," "Seeadler," "Sperber"; the gunboats "Wolf," "Iltis," and "Hyäne"; on surveying service, the "Möwe," and for service at Constantinople, the "Loreley." ("Marine Rundschau.")

An Imperial rescript has been issued from the Ministry of Marine, giving instructions for the division of the coast into six inspectorates, at the head of each of which will be placed a naval officer. This officer will be responsible for the service of the semaphores, the lighthouses, the pilotage, and everything connected with the safe navigation in the limits where the authority of the commandants of Kiel and Wilhelmshaven extend. These inspectors, who will be appointed directly from the Ministry of Marine, will exercise, in addition, a certain surveillance over the coasts.

The six inspectorates are as follows:—1st, the east and west coasts of Prussia; 2nd, the coasts of Pomerania and Mecklenburg; 3rd, Lübeck and the east coast of Schleswig-Holstein; 4th, the west coast of Schleswig-Holstein, with the exception of the district of the Elbe; 5th, the district of the Elbe and Weser; 6th, the district of the Jade and the island of Heligoland.

Russia.—Want of space has compelled us to defer any notice of the launch of the new coast-defence battle-ship "Admiral Ushakoff," a sister ship to the "Admiral Senyavin," which was launched somewhat earlier in the year. The new vessel was launched from the Baltic Works on the Neva on November 8th in presence of the Tsar, Tsarina, and a brilliant assembly. She is named after a distinguished commander of the Russian Black Sea Fleet at the end of last century.

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[1] For guard- and training-ships for engineers and stokers are detailed: the corvette "Prinzess Wilhelm," the "Sarnow," and the torpedo-transport-ship "Pelikan."

Her keel was laid in July, 1892, the Emperor and Empress having performed the ceremony. Her principal dimensions are:—Length, 278 ft.; beam, 52 ft.; mean draught, 17 ft.; displacement, 4,126 tons; engines to develop 5,000 I.H.P., with an estimated speed of 16 knots. She has a 10-in. steel water-line belt, with a 3-in. armoured deck, and 8-in. armoured transverse bulkheads forward and aft. Her armament will consist, as at present reported, of four 9-in. guns in two turrets, one forward and one aft, protected with 8-in. armour, four 6-in. Canet Q.F. guns in armoured sponsons, six 3-pr. Q.F. and eight 1-pr. Q.F. guns, and four torpedo-ubes.

On the 12th November was also launched at Nicolaieff the 1st class battle-ship "Tri Sviatitelya." Her principal dimensions are as follows:—Length, 357 ft. 6 in.; beam, 72 ft.; mean draught, 27 ft., with a displacement of 12,480 tons. Her engines are to indicate 16,000 H.P., and to give a speed of 17·5 knots. She will have a steel belt 18 in. thick, extending from 2 ft. above to 3 ft. below the water-line, an armoured 3-in. deck, a central battery protected with 5-in. steel armour, and with 16-in. armour bulkheads fore and aft. Her armament will consist of four 12-in. guns in two turrets, eight 6-in. guns, four 4·7 Q.F. guns, 16 small Q.F. guns, and six torpedo-tubes. The turrets will be protected with 16-in. armour. It is stated that a sister ship, to be named the "Paris," is to be laid down in the same yard.

The "Moscow Gazette" now states that the position selected for the new port in the Arctic Ocean is the Bay of Pujmanki, near Cape Kalassari, and to the eastward of Lake Enara, in North Finland. The region lying between the north coast of the Gulf of Bothnia and the Polar Sea was also examined, with the view of determining the best means of connecting the projected port with the Russo-Finnish railway system. The route recommended for the projected line of rail is from Uleaborg to the mouth of the Kemi River, thence to the eastern shore of Lake Enara, and beyond to Pujmanki Bay. The distance from Uleaborg to the Arctic Ocean by the proposed railway route is estimated at from 600 to 700 km.

United States.—We have mentioned in our previous Notes the launch during last year of the three coast-defence battle-ships "Indiana," "Massachusetts," and "Oregon"; the two first named were launched in February and June, respectively, from the yard of Messrs. Cramp, of Philadelphia, and the "Oregon" in October, from the Union Works of San Francisco. These three ships are alike; and as we are now enabled to give details and plans of the "Massachusetts" (Plate 5), we are practically giving a description of all three. The following are the principal dimensions:—Length, 348 ft. on load water-line; extreme breadth, 69 ft. 3 in.; mean normal draught, 24 ft.; displacement, 10,200 tons; tons to increase draught 1 in., 42.

The hull is protected for 60 per cent. of the length of the ship by an 18-in. belt of Harveyized nickel-steel, which rises 3 ft. above the water-line, and extends 4½ ft. below, and which turns in forward and aft round the bases of the armoured redoubts, out of which rise the armoured turrets. These redoubts, which protect the turning gear of the turrets, &c., have steel armour 17 in. in thickness. Forward and abaft the belt is an armoured belt 3 in. thick, sloping down 4½ ft. below the water-line; over the belt this deck is 2¾ in. thick. Coal bunkers are built over the belt deck, and cellulose is placed on the slopes of the protective deck forward and aft. In rear of the 18-in. belt is a backing of 6 in. of wood, two ¾-in. plates, and a 10-ft. belt of coal in the bunkers referred to above. There is a 10-in. armoured conning tower, with 7-in. armoured tubes for conducting speaking tubes, electric wires, &c., below.

Above the belt, the sides and superstructure in which are mounted the 6-in. guns are protected by 5-in. vertical steel armour. The powerful armament of the "Massachusetts" and her sisters is one of their most conspicuous features. It is superior to that of any of the latest of the battle-ships of foreign Powers. It consists of four 13-in., eight 8-in., and four 6-in. B.L. guns, 20 6-pr., and four 1-pr. Q.F. guns, four Gatling guns, and six torpedo-tubes.

The 13-in. guns are mounted in pairs in two turrets, one forward and one aft, the bases of each being protected by the armoured redoubts; the turrets have 17-in. armour placed on an incline, with armoured covers, and they are at such a height that the guns are 17 ft. 8 in. above the load water-line and 6 ft. above the deck over which they fire. The guns have also the advantage that they can be loaded in any position. The 8-in. guns are likewise mounted in pairs in armoured turrets 8½ in. thick, one of which is placed at each corner of the superstructure. They are 24 ft. 9 in. above the water, and can fire over the turrets which contain the 13-in. guns. The 8-in. guns, it is interesting to note, can pierce at a distance of 2 miles the armour of most of the foreign armoured cruisers. The 6-in. guns are mounted 14 ft. 10 in. above the water on the main-deck within the superstructure. They are protected by 5-in. armour, and are enclosed in 2-in. steel splinter bulkheads, inside of which the ammunition is passed up. Special attention has been devoted to the means of supplying ammunition to the battery and its thorough protection while passing from the magazines to the guns. The smaller guns are mounted in effective positions about the decks and in the fighting tops of the military mast. Of the six torpedo-tubes, two are fixed in the bow and stern respectively, while the others are training tubes, placed two on each broadside.

The "Massachusetts" and her sisters have twin-screws, the engines being of the vertical inverted triple-expansion type. The diameter of the high-pressure cylinder is 34½ in., of the intermediate, 48 in., of the low pressure, 75 in., the stroke being 42 in. The engines are to develop 9,000 I.H.P., with a maximum speed of 16½ knots, and a sustained sea speed of 15 knots. The supply of coal at the normal draught will be 400 tons, but there will be bunker capacity for 1,800 tons, which would increase her draught by about 33 inches; she could thus accomplish a long voyage without re-coaling. Her radius of action with 1,800 tons, at the ordinary cruising speed of 10 knots, is estimated at 16,000 nautical miles.

There are four double-ended boilers, each 18 ft. long and 15 ft. in diameter, and two single-ended donkey boilers, each 8½ ft. long and 10 ft. in diameter. All the boilers are of steel, and of the horizontal return-fire tubular type. Each boiler has eight furnaces, and the total heating surface of the main boilers is 17,460 sq. ft., with a total grate surface of 552 sq. ft. Each set of boilers and engines is in separate watertight compartments.

The following items concerning the battery of the "Massachusetts" and her sisters will be of interest. Each of the 13-in. guns is 40 ft. long, weighs 60½ tons, uses 550 lbs. of powder as a firing charge, and fires a shell weighing 1,100 lbs. The muzzle velocity is 2,100 ft. per second, the muzzle energy 33,627 ft.-tons, and the corresponding penetration in wrought iron 30·1 in. The 8-in. guns are 25 ft. 4 in. long, weigh 13·1 tons, and fire a 250-lb. shell with a charge of 105 to 115 lbs. of powder; the muzzle energy is 7,498 ft.-tons, and the penetration in wrought iron 18·1 in. The 6-in. guns are 18·8 ft. long, weigh 5·2 tons, fire a compound shell with a 44- to 45-lb. powder charge, and they will penetrate over 13 in. of wrought iron at the muzzle. A single discharge from all the guns of both main and secondary batteries will emit 6,924 lbs., or more than 3 tons, of steel.

The accompanying table will give a fair idea of the fighting value of the "Massachusetts" as compared with six of the latest battle-ships of other Powers:—

Details.	"Massachusetts." (U.S.)	"Royal Sovereign." (British.)	"Centurion." (British.)	"Massena." (French.)	"Sicilia." (Italian.)	"Brandenburg." (German.)	"George Pobledonosets." (Russian.)
Date of launch	1892	1891	1891	Building.	1891	1891	1891
Length on load-line (ft.)	348	380	360	363·5	400	354·33	320
Extreme breadth (ft.)	69·25	75	70	65·5	76·75	64	69
Mean draught (ft.)	24	27·5	25·5	26·25	28·5	24·58	26·53
Displacement (tons)	10,200	14,150	10,500	11,700	13,298	10,300	10,280
Maximum indicated horse power	9,000	13,000	13,000	12,000	19,500	9,500	15,000
,, speed (knots)	16·25	17·5	18	18	18	16	16
Normal coal capacity (tons)	400	900	750	785	1,200	(?)	700
Radius of action at 10 knots (sea miles)	3,550	5,000	5,000 (?)	4,000	(?)	(?)	(?)
Maximum thickness of armour (inches) Turrets	17	17	9	15	18	11·75	12
Maximum thickness of armour (inches) Belt	18	18	12	17 75	4	15·75	16
Armament	4 13-in. B.L.R.	4 13·5-in. B.L.R.	4 10-in. B.L.R	2 11·8 in. B L.R.	4 15·5 in. B.L.R.	6 11-in. B.L.R.	6 12-in. B.L.R.
	8 8-in. B.L.R.	10 6-in. Q.F.	10 4·7-in. Q.F.	2 10·5 in. B.L.R.	8 6-in. Q.F.	6 4-in. Q.F.	7 6-in. Q.F.
	4 6-in. B.L.R.	26 small Q.F.	8 6-pr. Q.F.	8 5·5-in. Q.F.	16 4·7-in. Q.F.	8 3·4-in. Q.F.	8 4-in. Q.F.
	20 6-pr. Q.F.	8 machine-guns	12 3-pr. Q F.	8 4-in. Q.F.	27 small Q.F.	A number of small rapid fire and machine-guns.	6 machine-guns.
	4 1-pr. Q.F.	...	7 machine-guns	...	2 machine-guns		
	4 Gatlings	...	...	12 3-pr. Q.F.			
	...	...	...	20 1-pr. Q.F.			
Torpedo-tubes	6	7	7	4	5	7	7

The Annual Report of the Chief of the Navy Bureau of Ordnance gives a good summary of the year's work in the Bureau, as well as an estimate for the next fiscal year, which is $7,145,801, of which $6,500,000 is for arming vessels already authorized. Of 453 guns, of calibres from 4 to 13 in., which have been ordered, 298 are completed, including 25 10-in., 8 12-in., and 5 13-in.; 188 are afloat, and forgings for 368 guns have been delivered. The 13-in. guns have not been tested as yet, owing to delays in mounting. Progress is being made on 8-in. nickel-steel guns, and on the Hurst 8-in. guns. Of the small guns for the secondary batteries (480 Hotchkiss and Drigg's guns), 360 are finished; 237 gun mountings have also been completed.

Smokeless powder is not yet suitable for regular use, but large quantities of brown powder are supplied by the California Powder Company of Santa-Cruz, and by Du Pont and Co., who have also supplied 50,000 lbs. of gun-cotton. The treatment of small-calibre projectiles by the Harvey process has proved very satisfactory. Experiments are being conducted in firing shells from high-power guns charged with gun-cotton and fulminate.

Contracts for 6,489 tons of armour have been made during the year, and the plants have been enlarged to admit of delivering the armour more rapidly. By the new arrangements armour can be supplied as fast as needed to the vessels in the ship-yards. The armour, both the nickel-steel and the Harveyized, continues excellent in quality. A number of new Howell and Whitehead torpedoes have been received. The difficulty with the main valve of the pneumatic guns of the "Vesuvius" has not been overcome, and Commodore Sampson recommends that the $450,000 appropriated for a similar vessel be used to build four torpedo-boats instead. ("Scientific American.")

The Secretary of the Navy has decided to entrust to a special committee the important work of determining the best and most economical method of correcting the defects of the new vessels reported to be top-heavy and crank. These are the "Detroit," "Montgomery," "Marblehead," "Machias," "Castine," "Cincinnati," and "Raleigh." The main duty of the Committee is to determine which of several plans which have been submitted for the redistribution and reduction of weights, and for otherwise correcting existing defects, is the best. ("Army and Navy Gazette.")

MILITARY.

Austria-Hungary.—The "Revue Mil. de l'Étranger," No. 792, contains a description of the *tente-abri* recently adopted in the army. The tent is formed by joining together two, four, or a larger number of "lozenges" of brown waterproof cloth, and can be supported in the centre by the rifle and bayonet. In general, each tent, however formed, gives cover to twice as many men as there are pieces of cloth, such of the latter as are not used for making the cover being used for the men to lie upon. Each infantry under-officer and private is provided with one piece of cloth weighing about 1·03 kils., and three small pickets weighing about 35 grams. each. The pieces of cloth can be used as cloaks (with hood).

Great interest has been excited in Vienna by a lecture given in November by Professor G. Wellner in which he described the flying machine recently invented by him. An account of the invention is given in the "Allg. Mil.-Zeitung," No. 96, of 1893, and also in the Austrian "Mittheilungen über Gegenstände des Artillerie- und Genie-Wesens," 12. Heft. The latter journal also gives illustrations of the principal arrangements of the machine. Although, in the opinion of experts, this invention is the nearest approach to a solution of the question of aerial locomotion that has yet been made, it does not appear from the various accounts that have been received that any actual ascent has taken place. According to the inventor's calculations, the machine he proposes to construct will be able to travel under favourable atmospheric conditions, with a load of 16 persons, at the rate of 70 miles an hour.

Belgium.—According to "La Belgique Militaire," the idea of adopting the German steel-shafted lance has been definitely abandoned. The hollow (female) white bamboo shaft has also been rejected. The latter weapon had a length of 2·75 m. (9 ft. ¼ in.). Experiments are now being made with lances of the English pattern, and others of Congo bamboo. The length of the patterns under trial is 2·85 m. (9 ft. 4¼ in.).

France.—The War Ministry has issued instructions that lightning conductors are not to be used on buildings intended for the storage of ammunition and explosive materials. In order to ensure as far as possible the safety of buildings of this nature, they are to be constructed as much as practicable of inflammable materials. ("La France Militaire.")

The "Rev. du Cercle Militaire" reports that the new rifle ranges at Maisons-Laffitte, near Paris, are nearly completed. The earth-works have been thrown up by military labour. The butts, which are broad enough to accommodate seven targets, are 7 m. high and have a thickness of 2 m. at the top. The length of range is 1,000 m.

During the present year the following foreigners commenced their studies at the Military School of St. Cyr:—A Roumanian, a Haytian, a Persian, and a grandson of Abd-el-Kader. Among the students who completed their studies during the year were an American, a Persian, and a son of the Prince of Monaco, the latter having since been appointed sub-lieutenant in the 2nd African Regiment. ("La France Militaire.")

Trial is being made in the squadrons of the Soudan Spahis of new saddles of which the tree and stirrups are made of aluminium. The saddles are of the regulation pattern, and the price is the same, but the weight is about 6½ lbs. less. ("Rev. de Cavalerie.")

Germany.—The Leipzig correspondent of "L'Avenir Militaire" draws particular attention to the remarkable performances of the railway administrations during the recent manœuvres. Not only was there no reduction of the ordinary traffic, but owing to the enormous number of sightseers the ordinary passenger trains had to be duplicated, and the presence of the Emperor and of numerous Princes with their suites made it necessary to put on a number of special trains every day, the hours of departure of which were not fixed until the last moment. Moreover, on the 8th and 9th September 50 military trains were despatched from the military station at Metz, without in any way affecting or being affected by the ordinary traffic. The most important and most interesting operation was the impromptu transport, on the 5th September, of the 33rd Infantry Division from Metz to the manœuvre ground at Courcelles, distant some 14 kilom. It was originally intended that the division should march to the ground, but the Emperor wished to try the experiment of transporting troops to the field of battle at a moment's notice, and the 33rd Division, which had been particularly hard-worked during the preceding days, was selected for the trial. The order was suddenly given at 4 A.M., without the slightest previous warning to the railway authorities, that the transport must be provided at once. The preliminary operations, *i.e.*, the transmission of this order to all concerned, the planning of the entrainment and transport, the grouping of the rolling-stock into trains, and telling the latter off to platforms, &c., were completed by 5.50 A.M. Between 6 and 7 A.M. the whole of the division, fighting train included (over 7,000 men), was entrained, and it was then transported and detrained near the field of battle, quite in the open, the horses, guns, &c., being disembarked by means of portable ramps.

The experiments made at the Imperial manœuvres at Metz, and at the cavalry manœuvres at Salzwedel, with the object of ascertaining whether it would be practicable in war to form corps of cavalry, consisting of two or more divisions, are

said to have shown decisively that the ordinary cavalry division is the largest unit that can be employed as such, either on the march or in combat. ("L'Avenir Militaire.")

For some years past not only have there been no officers of plebeian extraction in the cavalry of the Prussian Guard, but men belonging to the lowest grade of nobility (those merely entitled to the prefix "von") are in a minority as compared with princes, counts, and barons. Thus of the 253 officers borne on the Army List as belonging to the Guard cavalry, 32 are princes, 73 counts, and 36 barons, as against 112 officers who are merely entitled to the prefix. In some regiments the latter are in a very decided minority; as, for example, in the "Gardes du Corps," which numbers 2 princes, 17 counts, 2 barons, and only 7 of the simple nobility; of the latter, too, there are but 9 in the 1st Dragoons of the Guard. ("Rev. du Cercle Mil.")

According to the statistics of recruiting operations for 1892–93, out of 186,448 recruits incorporated in the army and navy, there were 182,415 who could read and write in German, and 3,328 who only possessed those powers in other languages; while the number of men totally illiterate was only 705. This is a reduction to 0·38 per cent. of illiterates, who, in 1882–83, numbered 1·38 per cent.

It is stated in the "Spectateur Militaire" that rumours are afloat that the lance is falling into disfavour in Germany, and that the cavalry will before long be deprived of the "queen of weapons." The opinion is said to be gaining ground that the lance is more embarrassing than useful.

The use of the snow-shoe appears to be making great progress in the German army. In the winter of 1891–92, experiments were made in three battalions of infantry and jägers, and the results were so favourable that, in the following winter, further orders were given, and another battalion was provided with the shoes. It now appears that the War Ministry has recently given a third and larger order to the manufacturers (the "Tourist" Company, of Berlin), and seven battalions in all are now provided with a complement of snow-shoes. The "Allg. Mil.-Zeitung" concludes that the practical use for military purposes of these novel aids to locomotion must be fully recognised by the authorities.

It is stated in the "Revue du Cercle Militaire" that the grand winter manœuvres of the Guard Corps will probably be held about the middle of February. The exact date of the manœuvres, which it is understood will be directed by the Emperor in person, will most likely not be published in advance, as it is believed to be His Majesty's intention that the troops in Berlin, Potsdam, Spandau, &c., shall march without previous warning, and be hurried, by forced marches, to the scene of operations, of which the central point will probably be Brandenburg, on the Havel. It is believed that there will be a grand night bivouac in the vicinity of that town, followed by a battle on the following day, the troops returning to their garrisons by rail.

Certain changes have been made in the conditions of admission to the War Academy. Instead of five years' service being necessary as heretofore, officers will be admitted to the examination who have completed three years' service, and candidates must not be within five years of their promotion to the rank of captain; whereas four years was the limit up to the present time. It is further ordered that candidates must be free from debts, and must be of sound constitution.

The War Minister has recently issued a decision which it is believed will have an important bearing on the physical fitness of the youth of the country for undergoing military training. In compliance with the representations of the central committee for the development of popular games, it has been decided that

in all garrison towns where these games are regularly organized, the drill grounds may be made use of for the purpose, under certain conditions.

According to the "Tägliche Rundschau," negotiations are in progress for the construction of a new bridge over the Rhine, between Strassburg and Kehl, the cost of which is estimated at 63,000*l*. The bridge, which is to be 16 m. wide, and to carry a roadway for ordinary traffic and one for tramway lines, will be of considerable strategic importance, as it will enable the Bühl-Kehl and Offenburg-Kehl tramways to discharge passengers in Strassburg.

Russia.—The regulation height for recruits of the cavalry of the line has hitherto been from 1·622 to 1·778 m. (roughly 5 ft. 3¾ in. to 5 ft. 9¾ in.). The standard has now been reduced to 1·598 m. minimum and 1·730 m. maximum (roughly 5 ft. 2¾ in. to 5 ft. 9 in.), with the object of diminishing the weight carried by the horse. The order announcing this alteration prescribes that it is more necessary than ever that the men should be of strong constitutions, muscular, and active, and that their legs should not be short in proportion to their height. ("Revue de Cavalerie.")

According to the "Invalide Russe," the number of men among the last recruits of 1892 who were absolutely illiterate, *i.e.*, could neither read nor write, amounted to 65·02 per cent.

The Artillery Committee has recently issued a memorandum on the subject of the use of aluminium in various articles of war material, in which the opinion is expressed that the metal could probably be employed with advantage in many parts of artillery wagons which do not require to be constructed in a very solid manner. It is calculated that if this be done the weight of the limber for the 9-cm. gun will be so far reduced as to admit of 20 or 25 additional rounds being carried. General Engelhardt is at present occupied with the question of providing the field artillery with a new type of limber which can be drawn by two horses; and the Committee consider that it is advisable to adopt aluminium in lieu of heavier metal in all those parts where its use is admissible. ("Revue d'Artillerie.")

With the object of ascertaining that the "intact reserve of supplies" (articles which have to be served out to the troops at the moment of mobilization) is actually in stock and in good condition, the Commander of the Guard Corps and Military District of St. Petersburg has appointed three committees to inspect the whole of the stores, and to furnish reports thereon by the 15th January. ("Invalide Russe.")

It is understood that the Russian autumn manœuvres of 1894 will be held in the neighbourhood of Smolensk, and will be attended by the troops of three military conscriptions, the garrisons of which represent a total effective of 300,000 men. ("Tägliche Rundschau.")

Spain.—According to the "Ejército Español," the approximate strength of the forces at the disposal of Marshal Campos for the operations at Melilla are as follows:—Headquarters: African Regiment, disciplinary battalion, six companies of engineers, six companies of foot artillery, four batteries of field artillery, one regiment of dragoons, and mounted escort; total, 3,520 men. 1st Army Corps: Two infantry divisions (each of three brigades), and two mountain batteries; total, 8,360. 2nd Army Corps: Two infantry divisions and two mountain batteries; total, 9,540 men. These forces, together with 350 men of the Marine Infantry, Gendarmerie, &c., give a grand total of about 21,770 men, 500 horses, and 48 guns.

Sweden and Norway.—The mixed commission of delegates from the War Ministries of Sweden and Norway, which was assembled some time ago for the purpose of deciding upon the adoption of a magazine rifle for the army of the two

States of the Union, has at last (according to the "Allg. Mil.-Zeitung") arrived at a decision. At first it was understood that the Danish Krag-Jörgensen rifle of 6·5 mm. would be adopted for the infantry of both kingdoms, but it was ultimately decided to introduce that arm in Norway only, and a rifle of the same calibre on the Mauser system has been adopted for the Swedish Army. The commission has recently been occupied with the question of making the Mauser magazine packet available for use with the Krag-Jörgensen rifle, and *vice versâ*.

Switzerland.—A project has been submitted to the Federal Assembly for the organization of machine-gun sections in the cavalry regiments. The section is to consist of one officer, one sergeant, one sergeant armourer, three corporals, twelve cavalry privates, two train soldiers, three machine-guns (there are three squadrons in the Swiss regiments), one four-horsed ammunition wagon, nineteen saddle horses, six pack horses, and four draught horses.

The fortification and defensive organization of the Saint-Gotthard have for some years received the closest attention of the military authorities. According to a recent law, as stated in the "Spectateur Militaire," the troops destined to occupy this formidable intrenched camp will in future be taken solely from the neighbouring population, and will consist of Landwehr only. In addition, a special corps, termed the "Thalwehr" ("Garde Régionale de la Vallée"), will be formed for the defence of the valleys. The instruction of all these men will be carried out within the limits of the camp. The command of the Saint-Gotthard is confided to an officer with the rank of a divisional colonel, *i.e.*, an officer corresponding in rank, &c., to the commander of an infantry division in other European armies. This officer, who has a Staff consisting of seven officers, is charged with the organization and direction of the defence, and is entirely responsible at all times for the instruction of the troops placed at his disposal, and all commanders of forts, batteries, and sections comprised in the *arrondissement* of the intrenched camp are under his immediate orders.

United States.—In the recently-issued annual report of the Secretary of War the opinion is expressed that wars with the Indians may practically be considered as having come to an end, and that consequently the army will very seldom be employed for these purposes. The report goes on to say that present circumstances necessitate the gradual concentration of the forces on the sea coasts and frontiers, and although any considerable increase of the army would not receive the approbation of the nation, the fortification of the 13 largest harbours will in the near future make it necessary to transform a portion of the infantry into artillery. The present strength of the army is 2,144 officers and 25,778 men.

FOREIGN PERIODICALS.

MILITARY.

Militär-Wochenblatt.—No. 105. "The Battle of Loigny-Poupry" (a review of Major Kunz's work). "The Extent of Front of Army Corps, &c., in the War of 1870–71" (*continued*). No. 106. "The Battle of Loigny-Poupry" (*concluded*). "The Extent of Front, &c." (*continued*). No. 107. "The Practical Conduct of Kriegsspiel." "A Few Remarks regarding the Provisional Drill Regulations for the Cavalry." "The Extent of Front, &c." (*concluded*). "The New Grouping of the French Forts." No. 108. "Inner and Outer Lines." "Musketry Inspection Exercises as prescribed in the New Musketry Regulations." "Judging Distance and Badges of Merit therefor." No. 109. "Manœuvre Reflections of a Cavalryman." "The War of 1806 and 1807" (*à propos* of Von Lettow-Vorbeck's book). No. 110. "Manœuvre Reflections, &c." (*concluded*). "Recent Exercises

at the Camp of Krassnoe Selo" (in these exercises small bodies of troops practised the operations of attack and defence of a position under conditions approximating to those of actual warfare, and with the utmost freedom of initiative and action on the part of the leaders and men). No. 112. "The Development of Field Artillery" (a lengthy and very favourable review of Lieut.-General H. Müller's "Die Entwickelung der Feldartillerie, &c., von 1815 bis 1892"). No. 113. "Changes during the Past Year" (general review of changes in the several branches of the German Army in 1893). "La Cavalerie sur le Champ de Bataille" (*à propos* of the "Lettres d'un Cavalier," in the February, March, April, and June (1893) numbers of the "Revue de Cavalerie"). "Military News from Russia" (a report, from the "Invalide Russe," on the working of the "Jagdkommandos"; a report by General Dragomirov, on a Cavalry Division inspected by him). "Swearing Fidelity to the Colours in the Austro-Hungarian Army."

Neue Militärische Blätter.—December, 1893. "Colonel de Ponchalon's 'Souvenirs de Guerre" (1870–71)" (*continued*). "The Battle Regulations of the Russian Army" (*concluded*). "A Sketch of the Battle of Lübeck" (*continued*). "General Skobelev and the Moral Element" (*continued*). "Reminiscences of the Campaign of 1866 in Italy" (*continued*). "Extracts from the 'Anweisungen zum Reitunterricht für die Kavallerie, &c.'" (*continued*).

Jahrbücher für die Deutsche Armee und Marine.—December, 1893. "Socialism and the Military System." "The French Military System since 1889" (*concluded*). "The Economical Aspect of Armoured Works." "The Provisional Cavalry Regulations from an Infantryman's Point of View" (comparison of Cavalry and Infantry Regulations as to the drill and employment of men on foot). "A Word on diminishing the Weight carried by the Soldier." "The 'Schleifenspiel'; a necessary Preliminary Practice for Individual Combat on Horseback" (in this practice, two or three men endeavour to snatch away a piece of cloth which the defender has placed near his shoulder). "Our Soldiers. Types in Peace and War" (from the Russian of N. Bukowski). "The French Naval Manœuvres of 1893" (by Vice-Admiral von Henk). "General Review of Recent Progress in Technical Military Matters" (small-arms, guns, and armour).

Journal des Sciences Militaires.—December, 1893. "The Rôle and Probable Mode of Action of Infantry in a Campaign of the Future." "The Battle of the Vesles" (*continued*). "Food for the Army" (*concluded*). "Marshal MacMahon." "The English Campaign in the Soudan, 1884–85" (*concluded*). "The Campaign of 1814" (*continued*).

Revue Militaire de l'Étranger.—December, 1893. "The New Peace Strength of the German Army, according to the Law of 3rd August, 1893." "The Servian Army in 1893" (*concluded*).

Spectateur Militaire.—1st December, 1893. "The Grand Manœuvres of the 2nd and 3rd Army Corps in 1893." "Notes on the Russian Army. The Troops" (*continued*). "The Capture of Sfax; July, 1881" (*continued*). "Memoirs of Ladies of the Court." 15th December. "The Grand Manœuvres, &c." (*concluded*). "The Capture of Sfax, &c." (*continued*). "Memoirs of Ladies of the Court" (*continued*).

Revue du Cercle Militaire.—No. 49. "Lieut. Mizon's Mission" (with map). "The Incorporation in Time of Peace of Men who are only Fit for Employment in the Auxiliary Services" (*concluded*). "The Problem of Mounted Infantry resolved by the Employment of the Bicycle" (*continued*). No. 50. "Lieut. Mizon's Mission" (*concluded*). "The New German Regulations for Field Fortification" (*concluded*). "The Problem of Mounted Infantry, &c." (*continued*). No. 51. "Spain in Morocco. The Mobilization of the Spanish Army." "The Problem of Mounted Infantry, &c." (*continued*). No. 52. "Maxim Machine-guns and the Swiss Cavalry." "The Problem of Mounted Infantry, &c." (*continued*). No. 53. "The Problem of Mounted Infantry, &c." (*concluded*). (This interesting series of articles concludes with a description and illustrations of the "bicyclette transportable (système Noël)," which the author considers thoroughly

adapted to the wants of the mounted infantryman). "The Maxim Machine-gun and the Swiss Cavalry" (*concluded*).

Revue de Cavalerie.—November, 1893. "The Inauguration of the Statue of Lasalle at Lunéville." "The Cavalry Manœuvres at Bléré." "Shoulder In" (its importance in training the horse). "The Supply of Men and Remounts of the Cavalry of the Grand Army in 1806–07" (*continued*). "The Horse. By a Breeder" (*continued*). "The New Cavalry Barracks at Vincennes." December, 1893. "The Armament of the Cuirassiers in 1811." "The Cavalry Manœuvres at Bléré" (*continued*). "The Paces of Horses revealed by the Experimental Method" (*continued*).

Revue Militaire Suisse.—December, 1893. "Military Cycling; its Rôle and Employment" (*concluded*). "The Tubular (or Hollow) Hebler-Krnka Bullet" (a lengthy description of the results obtained by Professor Hebler, being a French translation of his article in the "Allg. Schw. Militärzeitung").

NOTICES OF BOOKS.

Historical Records of the 14th Regiment. Edited by Captain H. O'Donnell. Devonport: A. H. Swiss, 1893. Price 30*s*.

This work is a valuable addition to the histories of British regiments. The services of the 14th, in peace and war, for more than two centuries are, on the whole, carefully and well recorded. Yet there are some errors and inaccuracies that seem to call for notice.

In the description of the attack of the Hill of Bougé, at Namur, in 1695, and referring to the account in the "London Gazette," we are told that "the date is wrongly stated as Monday, 18th July, a mistake repeated by some later writers." The difference between old style and new style was then only ten days, so that the mistake is that made only in the Records. The detailed account of the capture of St. Lucia in 1796 is remarkable for the omission of any mention of the 27th Inniskillings, which regiment, led by Brigadier-General (afterwards Sir John) Moore, bore the chief part in the most critical operations. There are, besides, many clerical and typographical errors which may be corrected in a future edition. The movements of the regiment, whether by land or sea, by road or rail, are described throughout the book by Cannon's unmilitary term "proceeded"; and further, even the words of Cannon's apocryphal records are followed in telling us that in 1695 "the attack on Kenoque was then *desisted in*."

The incident in the action of Famars, just a hundred years ago, which led to the adoption of the revolutionary air of "Ça ira" as the regimental quick-step, is so inspiriting that it may be repeated here. The French attacked so fiercely that the regiment wavered for a moment; but Lieutenant-Colonel Doyle "was not at a loss, for, dashing to the front, he called out in a loud voice, 'Come along, my lads; let's break the scoundrels to their own damned tune. Drummers strike up "Ça ira."' The effect was irresistible."

There are copious extracts from the Earl of Albemarle's interesting "Fifty Years of my Life," and from the writings of General Sir James Alexander. The notes on the equipment, badges, and colours fully sustain the high reputation of Mr. S. M. Milne for careful research and historical accuracy. The coloured plates representing the uniform of the regiment at different times are artistically drawn by Mr. P. W. Reynolds, and beautifully coloured by Messrs. Goodall and Suddick, of Leeds, and

some of the portraits of celebrities are successfully reproduced. The arrangement of the contents of the book is admirable; and the appendices, containing biographical sketches of colonels and other distinguished officers, letters, anecdotes, and legends, are interesting and instructive. O'C.

The Order of Field Service of the German Army. Authorized Translation by J. M. GAWNE, Major, The King's Own (Royal Lancaster) Regiment, and SPENCER WILKINSON, author of "The Brain of an Army," &c. Printed for the Manchester Tactical Society, by E. Stanford, London: 1893.

The English title adopted by Major Gawne and Captain Wilkinson for their excellent translation of the well-known Felddienst-Ordnung is no doubt quite correct as a literal translation of the German, but it may be doubted whether some other rendering of the original, such as "Regulations for Field Service," would not have conveyed a clearer idea of the contents and scope of the book than is given by the title preferred by the translators; indeed the term "Field Service Regulations" is employed in paras. 18 and 19 of the introduction. According to the definition given in para. 18, "Field service embraces all the duties of troops in war," a somewhat comprehensive statement. In point of fact the subjects included under the general term "Felddienst" comprise the following:—

Part I.

A. The order of battle, *i.e.*, the normal constitution of the larger units, and the distribution of troops (or their temporary grouping for special strategic and tactical purposes).
B. Communications between staffs and troops. Issue of orders generally; orders for particular operations. Information, messages, reports, sketches, war diaries. Transmission of orders and messages. General principles for the conduct of correspondence.
C. Reconnaissance.
D. Protection (more usually designated the "Service of Security"). Protection of the march; advanced, flank, and rear guards. Outposts for all arms and under various circumstances.
E. Marches.
F. Quarters; cantonments and bivouacs.
G. Baggage, ammunition columns and trains.
H. Subsistence; supply of provisions for men and horses by inhabitants, from magazines or wagons, or by requisition.
I. Medical service; personnel and matériel for various units; duties in quarters, on the march, and in action; regulations under the Geneva Convention.
K. Ammunition supply.
L. Railways and telegraphs; transport of troops and matériel by rail; destruction of railways and telegraphs.
M. Field gendarmerie.

Part II.—Regulations for Autumn Manœuvres.

From the above extract from the table of contents, it will be seen that the ground covered by the Felddienst-Ordnung is pretty extensive, and includes many subjects which, owing to the lack of a similar text-book, are perforce squeezed into our British Cavalry, Artillery, and Infantry Drill Books. Admirable as these German Regulations undoubtedly are, as containing in a comparatively small space (about 230 pages of the translation), the outlines of instruction on so many important subjects, it should be borne in mind by those who advocate mere skeleton text-books, that the German Drill Books for the several arms and the Regulations under notice are written for the guidance of men who live in an atmosphere of drill, are daily engaged in professional work from morning till night under constant and minute inspection, and are guided by a certain amount of tradition or *lex non scripta* which, so long as it does not contradict the text-books, is as binding as the Regulations themselves. For officers serving under such conditions, a very concise official text-book is perhaps sufficient, but it would be a

mistake to suppose even in their case that there are no other text-books or guides in use than those issued by authority.

It should be added that Major Gawne has added a short and useful appendix, containing an explanation in outline of the organization, &c., of the several arms, and it may be noticed that he refers in this appendix to the "Field Service Manual," which it is to be presumed is only a *third* title for the Felddienst-Ordnung.

In case of a reprint being called for, it would be well if the Mannlicher rifle (page 234) were called by its proper name and not termed the "Männlicher." There are also a few misprints, such as "Mochenblatt" (p. 241), but as a rule the work is thoroughly well done.

The Manchester Tactical Society has conferred a real benefit on the army by issuing this excellent translation of a work which is very generally acknowledged to be a model of its kind.

The Pamirs. By the Earl of DUNMORE, F.R.G.S. 2 vols. London: John Murray, 1893. Price 24*s.*

Though these well printed and tastefully bound volumes are simply the narrative, in the form of a diary, of a year's expedition through Kashmir, Western Tibet, Chinese Tartary, the Pamirs, and Russian Central Asia—a narrative written only for private perusal—it is fortunate that Lord Dunmore has been induced to publish them. The adventures and incidents recorded are far too numerous to be noticed here, and there is only space to say that the style is plain and perspicuous, and that the descriptions of scenery are singularly vivid, and abound in poetic imagery. The illustrations, some fifty in number, are admirable. They are nearly all reproductions of sketches by Lord Dunmore, or of excellent photographs taken by his companion, Major Roche, of the 3rd Dragoon Guards. At the beginning of each volume there is a "glossary" of words from a dozen Eastern languages. This will be useful to many readers. Yet two of these translations are open to objection: "a valley" cannot be accepted as the English equivalent of "nullah," and "ghee" is certainly not "lard for cooking," for lard is the fat of pigs, an abomination to both Hindoos and Mussulmans. "Liquid butter" would be a fair translation.

The author, having received from Russians of all ranks civility of which he "cannot speak too highly," and having, besides, been accorded facilities for his journeyings by Chinese officials, has studiously avoided expressing any opinions on the political aspect of affairs in the Pamirs. Still his narrative contains, unavoidably, much valuable information bearing on the subject which he considers himself interdicted from directly treating. "The Pamirs" will, therefore, be useful to students of Central Asian questions, as well as to future travellers in the countries so well described. O'C.

LIST OF RECENT FOREIGN BOOKS (MILITARY).

La Tactique appliquée au Terrain. (Études raisonnées sur la carte; les détachements de toutes armes, le corps d'armée). By Z. MUMME. Paris: Lavauzelle, 1894. 5 fr.

Étude sur l'Infanterie Légère, l'Organisation et l'Emploi des Troupes du Génie dans la Guerre de Campagne et la Guerre de Siége. By General BRIALMONT. Liége: Direction de la "Revue de l'Armée belge," 1893. 1 fr. 50.

École du Cavalier à Pied—à Cheval. Texte extrait du décret du 31 *Mai* 1882, *revisé et complété jusqu'au* 1*er Décembre*, 1893; *illustrations par le* Capitaine E. PICARD *et le* Docteur G. BOUCHARD. 83 *planches comprenant plus de* 200 *figures démonstratives d'après nature.* Paris: Baudoin, 1893. 10 fr.

This is an illustrated edition of the French Cavalry Drill Regulations; a complete school of military equitation, in which the proper way of carrying out the instructions contained in the text, and the faults which most commonly present themselves in the *manège*, are shown by a series of pictures taken from life by instantaneous photography.

Le Blocus de Paris et la Première Armée de la Loire. Par A. G. *Troisième et dernière Partie. Champigny, Loigny-Orléans, résumé et conclusions.* Paris: Baudoin, 1893. 4 fr.

The first part of this work, "*Depuis la Capitulation de Sedan jusqu'à la Capitulation de Metz*," was published in 1889. Price 3 fr. The second part, "*Coulmiers et ses Suites*," appeared in 1890. Price 3 fr.

Mémoires du Général Radet, d'après ses papiers personnels et les archives de l'État. By A. Combier. Paris: Baudoin, 1893. 10 fr.

Une Armée dans les Neiges; Journal d'un Volontaire du Corps Francs des Vosges (1870–71). Paris: Rouam, 1894. 6 fr.

L'Armée de l'Est. By Grenest. Paris: Garnier, 1893. 3 fr. 50.

La France Économique et l'Armée. By E. Delaperrierre, Intendant Général. Pp. 612, with 22 maps, &c. Paris: Lavauzelle, 1893. 12 fr.

Autour du Tonkin. By (Prince) Henri Ph. d'Orléans. With numerous maps and illustrations. Paris: Lévy, 1894. 7 fr. 50.

La Vie Militaire à l'Étranger. Un Congé au Queen's Royal South-Surrey Régiment. By G. Tricoche, ex-officer of Artillery. Paris: Lavauzelle, 1893. 3 fr.

Studien über den Krieg. Auf Grundlage des deutsch-französischen Krieges 1870–71. *Erster Theil. Ereignisse in den Grenzbezirken* (*vom* 15. *Juli bis* 2. *August* 1870). Berlin: Mittler, 1892. 10 mks.

Die Schlachtfelder von Metz, gewidmet Seiner Majestät Kaiser Wilhelm II. By Major O. Taubert. 1. Lieferung. Berlin: Duncker, 1894. 12 mks.

This work, which will consist of two volumes, is highly spoken of in the German press. The first volume contains 12 beautifully executed photogravures of some of the most important battlefields, with descriptive text.

Beiträge zur taktischen Ausbildung unserer Offiziere. I. Offizier-Felddienst-Übungen. By Lieut.-Colonel von Litzmann. With sketches and map. Leipzig: Lang, 1893. 2 mks. 50.

Die Entwickelung der Feldartillerie in Bezug auf Material, Organisation und Taktik von 1815 *bis* 1892. *Mit besonderer Berücksichtigung der Preussischen und Deutschen Artillerie, &c.* By Lieut.-General H. Müller. 2 vols. Berlin: Mittler, 1893. 16 mks.

Der kürzeste Weg nach Konstantinopel. Ein Beispiel für das Zusammenwirken von Flotte und Heer. By Captain Stenzel. Kiel: Toeche, 1893. 1 mk. 50.

Geschichte der Schweizerischen Neutralität. By Dr. Paul Schweizer, Professor in the University of Zurich. Vol. 1. Frauenfeld: Huber, 1893. 5 mks.

The Army Book for the British Empire. A Record of the Development and Present Composition of the Military Forces and their Duties in Peace and War. By Lieut.-General W. H. Goodenough, R.A., C.B., and Lieut.-Colonel J. C. Dalton (h.p.), R.A., aided by various contributors. London: printed for Her Majesty's Stationery Office, 1893. Price 5*s.*

The Rise of our East African Empire. Early Efforts in Nyasaland and Uganda. By Captain F. D. Lugard, D.S.O. 2 vols., with 130 illustrations and 14 specially prepared maps. Edinburgh and London: W. Blackwood and Sons, 1893. Price 2*l.* 2*s.*

Physical Drill of all Nations. By A. Alexander, F.R.G.S. With a Prefatory Letter by the Right Hon. Viscount Wolseley, K.P., G.C.B. London: G. Philip and Son, 1893. Price 3*s.* 6*d.*

NAMES OF MEMBERS who joined the Institution between the 1st October and the 31st December, 1893.

LIFE MEMBERS.

Dent, W. H., Lieut. Yorks Regt.
Drury, R. C., Major Lan. Arty. (S. Div. R.A.).
Robertson, John H., Lieut. R.N.
Davidson, F. A. L., Capt. Rl. Sco. Fus.
Napier, G. S. F., Lieut. Rl. Suss. Regt.
Hume, C. V., Capt. R.A.
Norris, S. L., Capt. R.E.
Boyle, W. H. D., Sub-Lieut. R.N.
Rose, John, Major, late York and Lanc. Regt.
Hughes, E. H., Capt. York and Lanc. Regt.
Millner, J. K., Capt. K.R.R.C.
Keane, Sir John, Bart., Lieut. R.A.
Walker, H. M., Lieut. 1st Life Guards.
Stuart, J. N., Lt.-Col. Cossipore Vol. Arty.
Wray, J. Copley, Col., late Comdt. 3rd and 4th Batt. Manch. Regt.
Giles, Hubert G., Lieut. and Comr. R.N.
Stewart, Robert H. J., Lieut. and Comr. R.N.
Hawkshaw, J. C., M.I.C.E., Lt.-Col. Engr. and Rail. Vol. Staff Corps.
Barry, J. W., M.I.C.E., Lt.-Col. Engr. and Rail. Vol. Staff Corps.
Baker, Sir Benjamin, K.C.M.G., M.I.C.E., Lt.-Col. Engr. and Rail. Vol. Staff Corps.
Andrews, E., M.I.C.E., Major Engr. and Rail. Vol. Staff Corps.
Brady, F., M.I.C.E., Major Engr. and Rail. Vol. Staff Corps.
Gordon, J. G., Capt., late 3rd Glam. Vol. Rifles.
Mildmay, A. R., Lieut. K.R.R.C.
Ramsay, T. B., Capt. Rif. Bde.

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Bacon, B. K. W., Lieut. 3rd Batt. Worc. Regt.
Pearce, Henry, L. D., Lieut. R.N.
King-King, J. G., Capt. Rl. W. Sur. Regt.
Close, Francis A., Admiral.
Spence, J., Lt.-Col. (h.p.) Yorks. L.I.
Hawes, B. R., Major Rl. Mun. Fus.
Mulcahy, F. E., Lt.-Col. Ord. Store Dept.
Gogarty, H. E., Lieut. Rl. Sco. Fus.
Farrant, H. C. B., Lt.-Col. late N. Lan. Regt.
Arthur, A. M., Lt.-Col. late Devon Regt.
Beevor, W. C., M.B., Surg.-Capt. 1st Scots. Gds.
Tighe, R. H., Major 3rd Batt. E. Sur. Regt.
Nicholson, C. L., Lieut. P.W.O. Yorks Regt.
Henderson, J. A., Capt. 8th Hussars.
Montgomery, R. A. K., Capt. R.A.
White, Hon. R., Capt. Rl. Welsh Fus.
Carnegy, P. M., Capt. Ind. S.C.
Withington, G. E. W., Capt. S. Lan. Regt.
Upperton, S., Lieut. S. Lan. Regt.
James, E. T., Lieut. S. Lan. Regt.
Prendergast, D. G., Capt. S. Lan. Regt.
Murray, S. L., Lieut. Gord. Highrs.
Pawle, A. G., Capt. 18th Middx. Vol. Rifles.
Thompson, W. P., Lieut. R.N.R.
Ottley, W., Lt.-Col. 1st Worc. and Warwick. Vol. Arty. (S. Div. R.A.).
Rogers, T., Rev., Chaplain 4th V.B. Dur. L.I.
Anderson, C. F., Lieut. R.E.
Blaine, E. E., Lieut. Rl. Sco. Fus.
Lewis, C. H., Lieut. Ind. S.C.
Philips, F. C., Lieut. Colds. Gds.
Bentinck, R. J., Lieut. Ind. S.C.
Dowse, H. E., Surg.-Capt. A.M.S.
Temple, R. C., Lt.-Col. Rangoon Port Defence Vols.
Fraser, A., Major Rangoon Vol. Arty.
Paterson, W. S., Capt. Rangoon Vol. Arty.
Winter, R. R., Comr. Rangoon Naval Vols.
Cotesworth, Hugh, Lieut. R.N.
Crosby, J. G., Lieut. 3rd V.B. Rl. Fus.
MacCarthy-O'Leary, W., Major S. Lan. Regt.
Hilliard-Atteridge, A., Lieut. 16th Middx. Vol. Arty.
Kimberley, T. E., Lieut. 1st Worc. and Warwick. Vol. Arty. (S. Div. R.A.).
Bernard, John, Capt. R.M.L.I.
Mansel, W. L., Major S. Lan. Regt.
Manson, E. E. M. D., Capt. S. Lan. Regt.
Smith, F., Vet.-Capt. Army Vet. Dept.
Schreiber, C. S., Lieut. 1st Life Gds.
Story, E. H., Lieut. late R.N.R.

Hawkshaw, E. C., Major R.A.
Turner, A. E., C.B., Col. R.A.
Dalton, P., Capt. 3rd V.B. Rl. Fus.
Sanders, Lionel F. W., Lieut. R.N.
Humfrey, J. C. T., Major A.P.D.
Eardley-Wilmot, Irton, Capt. Ind. S.C.
Ridley, E. K., Capt. Dorset Regt.
Carte, T. E., Capt. R.A.
Yorke, F. A., Major R.H.A.
Conolly, E. R., Col. late Ben. S.C.
Wrenn, John H., Capt. 1st Lon. Vol. Arty. (E. Div. R.A.).
Urquhart, W. A., Major R.A.
Hennell, A. R., Major Hamps. Regt.
Brough, J. F., Lt.-Col. R.H.A.
Hall, R. H., Major S. Lan. Regt.
Gellibrand, J., Lieut. S. Lan. Regt.
Thompson, J., Lt.-Col. Engr. and Rail. Vol. Staff Corps.
Blake, G. F., Maj.-Gen., R.M.L.I. (retd.)
Livingstone, H. A. A., Capt. R.E.
Mundy, R. E., Lt.-Col. R.A.
Carr, H. C., Lieut. R.N.R.
Horniblow, T., Lt.-Col. late 24th Regt.
Walsh, Arthur H., Lieut. (retd.) R.N.
Harris, S. G. V., Lieut. Glam. Arty. (W. Div. R.A.).
Palmer, George, Capt. (retd.) R.N.
Courtenay, M. H., Lieut. R.A.
Geary, H. G. F., Lieut. R.A.
Oakley, Sir Henry, Col. Engr. and Rail. Vol. Staff Corps.
Fenton, Sir Myles, Lt.-Col. Engr. and Rail. Vol. Staff Corps.
Birt, W., Lt.-Col. Engr. and Rail. Vol. Staff Corps.
Scotter, C., Lt.-Col. Engr. and Rail. Vol. Staff Corps.
Pollitt, W., Lt.-Col. Engr. and Rail. Vol. Staff Corps.
Newton, G. B., Lt.-Col. Engr. and Rail. Vol. Staff Corps.
Galbraith, W., M.I.C.E., Lt.-Col. Engr. and Rail. Vol. Staff Corps.
Conacher, J., Lt.-Col. Engr. and Rail. Vol. Staff Corps.
Turner, G. H., Lt.-Col. Engr. and Rail. Vol. Staff Corps.
Hayter, H., M.I.C.E., Lt.-Col. Engr. and Rail. Vol. Staff Corps.
Waring, H., Lt.-Col. Engr. and Rail. Vol. Staff Corps.
Lucas, Sir Thomas, Bart., Lt.-Col. Engr. and Rail. Vol. Staff Corps.
Phillips, J. O., Major Engr. and Rail. Vol. Staff Corps.
Graham, G., M.I.C.E., Major Engr. and Rail. Vol. Staff Corps.
McDonald, J. A., Major Engr. and Rail. Vol. Staff Corps.
Woods, W., Major Hants Yeo. Cav.
Osborne, Frank O. C., Lieut. R.N.
Fowler, Sir John, Bart., K.C.M.G., M.I.C.E., Lt.-Col. Engr. and Rail. Vol. Staff Corps.
Le Mesurier, T. A., Lt.-Col. Army S.C.
Fraser, H. C., Lieut. 1st Life Guards.
Cusins, A. G. T., Lieut. R.E.
Garwood, F. S., Lieut. R.E.
Jelf, R. J., Lieut. R.E.
Armstrong, B. H., Lieut. R.E.
McClintock, B. L., Lieut. R.E.

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